Pit and Quarry

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HANDLING ▪ CRUSHING ▪ SCREENING ▪ WASHING

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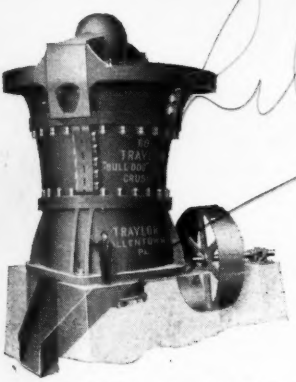

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March 1, 1925

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A Semi-Monthly Publication for Producers and Manufacturers of Sand, Gravel, Stone, Cement, Gypsum, Lime and Other Non-Metallic Minerals.

VOL. 9 CHICAGO, ILL., MARCH 1, 1925 NO. 11

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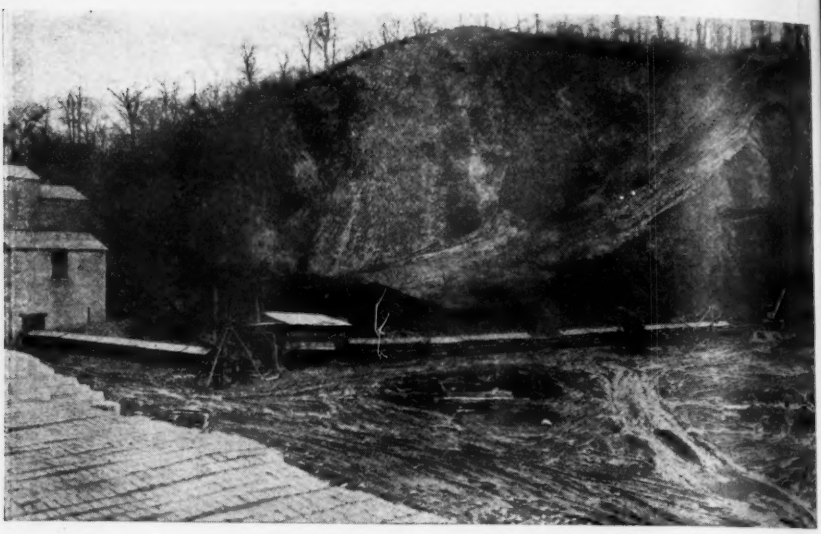

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Pit and Quarry

Vol. 9 Chicago, Ill., March 1, 1925 No. 11

Fear As An Obstacle to the Executive

UNDOUBTEDLY every executive would resent the accusation that he is handicapped by fear. It seems absurd to assert that a man who stands at the head of a thriving business, who has demonstrated his ability to build up an organization in the industrial world, is afraid. Yet such is often the case. There is a certain type of fear that is as potent and as undesirable as the kinds more commonly known. It is not fear of danger or fear of disaster; it is the fear of being misunderstood, of giving a wrong impression. Fear of this kind is a strong factor in the failure of some executives in the handling of men.

The successful executive will study the problem of men. There is nothing more essential than that. He can employ experts to analyze the various phases of his business, but the problem of the men he must accept as his. Without such knowledge he is a weak executive. Although he has all knowledge regarding the industry, although he is wise and skilful in formulating plans for the future, he is not a strong executive unless he is successful in dealing with his men. And his failure in this one phase of his work is often due to this weakness of which he is unaware—fear. He is afraid of his men. He cannot meet them with frankness and confidence. He is ill at ease in their presence. He is self conscious and unnatural when he comes in contact with them. With his friends and business associates he is himself, gracious, friendly, easy of manner. Before his employees he is apparently cold, haughty and indifferent. He cannot overcome a feeling that his men are judging him severely, that they are hostile in their attitude toward him. His fear of their ill will causes him to give them a wrong impression; it creates a barrier which should never have come into existence and which could be removed.

These workmen are, as a rule, inclined to be satisfied and eager to be loyal. If they are treated fairly, they are aware of it and responsive to appeals for their good will. In emergencies they show remarkable qualities of endurance, energy and devotion, which are vital assets for achievement. They are not as critical as they may seem to be. They are easily won and are worth winning. They detect this self consciousness in their superiors and mistake it for scorn and pride. They are, of course, entirely unaware that it is a form of fear. Fear of them! Preposterous! They are the ones who should be afraid. They would laugh to scorn such an idea.

This fear which prevents the executive from getting closer to his men is due to the fact that he does not understand them. He does not like to appear before them, and he does not permit them to come to him. The idea of such meetings is unbearable. The reason for most fear is a lack of understanding. As soon as anything is understood, it no longer is an object of fear. Many an executive who is thus afraid to meet his men has erroneous ideas concerning them. He believes that they are always verging on a state of discontent, that labor troubles are constantly just around the corner. This may or may not be true. His thinking it will not make it true. There is no reason for refusing to face the situation. If discontent is lurking about, it may be averted by a friendly meeting and a better understanding; if not, it may be permanently dispelled by such harmonious conditions.

Another misconception of the employee which stimulates fear in some executives is a belief that the workmen are always making comparisons between themselves and the employer. He thinks the workers are noting his clothes, conjecturing as to his income, and comparing his economic status with their own. It is more than likely that those are not the thoughts

in the minds of his employees. If he has something of interest to say to them, the men are too much engrossed in what he is saying to note the quality of his clothes. If his attitude is friendly without being condescending, the men are flattered and pleased to an amazing degree.

Overcoming this fear of criticism is not an easy task for some types of men. Some of the sternest exteriors conceal a timid and reticent personality. Fear is an instinct and must be inhibited. The more subtle the type of fear, the more difficult the process of inhibition. The executive who realizes that he is possessed of this fear of the criticism of his men can go far toward conquering it. He will do well to study the men with as much diligence as he would apply to a problem of science, to know as much about them as he does about the product with which he deals or the market that he supplies. They are as important to his budget as the materials with which they work; they are a determining factor in the year's assets and liabilities.

The 1925 Hand Book

THE 1925 edition of the PIT AND QUARRY HAND BOOK has now been distributed. We have endeavored to give to the producer in the non-metallic industries a valuable reference book. The new edition is a much larger and a more complete book and contains several new sections. The worth of the new edition will be determined by its usefulness in practical ways. To be of value, information must be easily accessible when it is needed. A delay in securing data on a particular subject may render the information useless when it is obtained. To eliminate such delays is our purpose in compiling the HAND BOOK.

The PIT AND QUARRY HAND BOOK is in its infancy; it is three years old. Its future opens up almost unlimited possibilities for growth. There are many opportunities for service which it has not as yet developed. Already plans for a greater HAND BOOK in 1926 are being considered. Its goal is to offer maximum service; to contain the solution of the problem which confronts the producer, whatever that problem may be. There are many ways of approaching such a goal. The task is ours. There is one way in which we need assistance. If we might receive suggestions from those who use the HAND BOOK; if every time some information which is needed is lacking we were informed of the fact, we could render such suggestions valuable to the entire field through the 1926 HAND BOOK. Our efforts to make it of wider scope and usefulness will be untiring and will be directed along lines suggested by our readers.

Already we are receiving expressions of appreciation of the 1925 HAND BOOK. It is gratifying to have our efforts meet with the approval of the readers. Their hearty commendation gives us keen satisfaction. If they will be as generous with suggestions and requests for data for the next HAND BOOK, it will enable us to increase its value to a large degree. Our greatest concern is with our next enterprise; we are looking to the future.

A Pit and Quarry Index

DURING the past few months an unusually large number of letters have been received asking in substance, "In what number of Pit and Quarry did an article on _____ appear?" Some of the letters stated that Pit and Quarry was kept on file, but a certain article could not be located.

These inquiries have brought forth the question of publishing an index to each volume of Pit and Quarry. Each volume consists of twelve consecutive numbers. An index could be published listing under their various subject headings all articles that appeared in the twelve numbers. Such an index would of course be published separately and distributed without cost to the reader.

The governing factor in deciding this question is the utility of such an index. Does the reader want it? Will it prove helpful? If there are enough readers desirous of having such an index, it will be published. Each reader interested is urged to write to the editor.

Toronto Cement Corporation Limited Building Near Beachville, Ontario

Design Particularly Free from Elevators and Conveyors. Daily Initial Capacity 1,500 Barrels, Ultimate 3,000 Barrels

THE Toronto Cement Corporation Limited owns 182 acres of freehold land near Beachville, Ontario, situated on the Canadian National Railway, midway between Woodstock and Ingersoll, in the Province of Ontario. This property contains large deposits of very suitable limestone and clay especially adapted for the manufacture of high grade Portland cement. The Company after making most thorough and exhaustive tests of these raw materials decided to purchase this property from the Ontario Cement Company who were the original owners and to construct their new Canadian plant thereon.

After a detailed study of the sources of supply and demand, good roads program, public and private building under way and contemplated, Government and railway improvements projected, the company decided to construct a plant with an initial daily capacity of 1500 barrels and an ultimate capacity of 3,000 barrels daily and in designing the plant, the building layout was made accordingly.

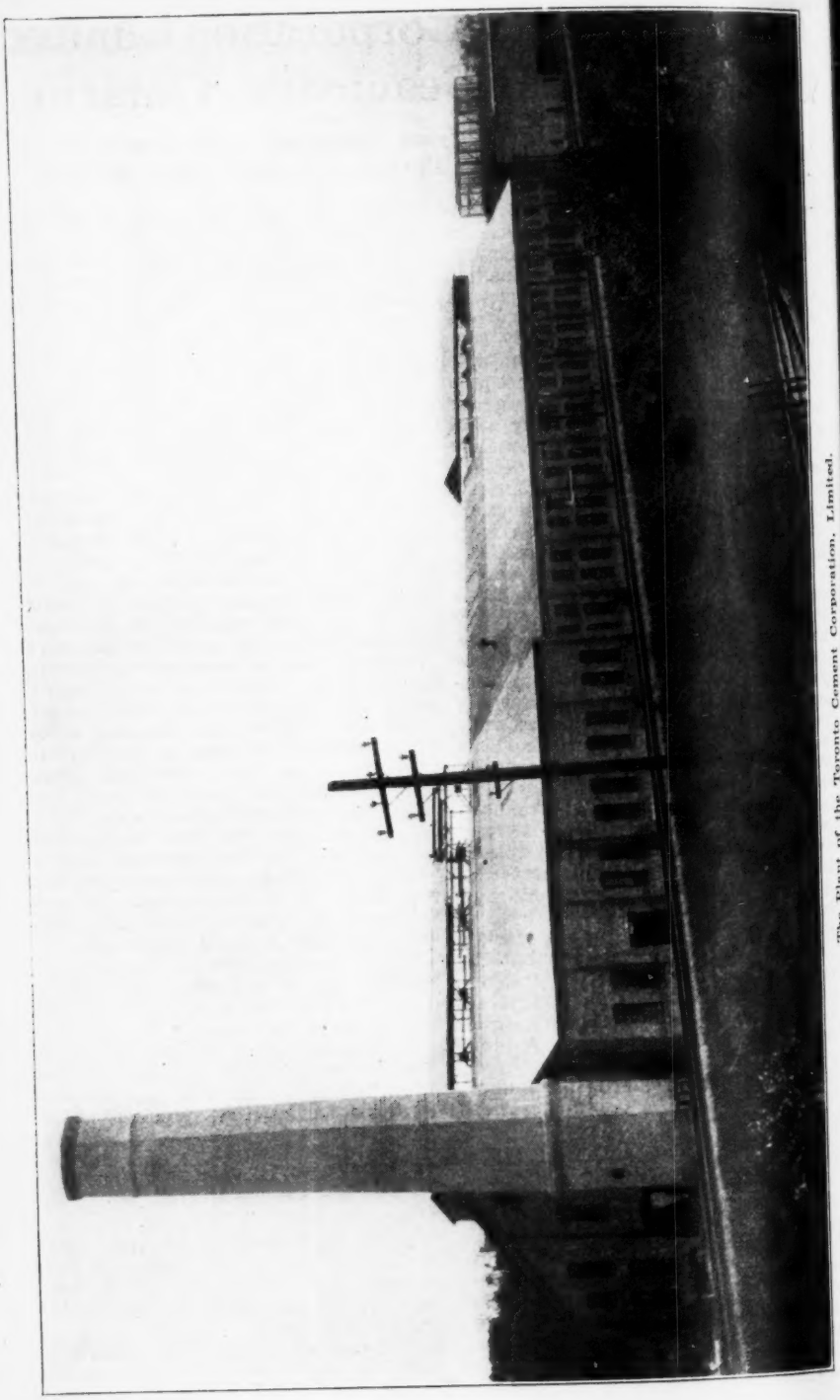
All the buildings are of standard mill construction type, and of steel and reinforced concrete. The rotary kiln building which is now completed is 70x290 feet; the materials storage building will be 85x540 feet with a storage capacity of 25,000 tons of coal, 5,000 tons of gypsum, 75,000 barrels of clinker, 50,000 tons of crushed limestone and 25,000 tons of clay, all under cover. The fuel mill building is completed and is 35x70 feet. A temporary cement warehouse 65x120 feet has been completed and it is planned to replace this with a permanent concrete warehouse of silo construction having a capacity of 150,000 barrels. The main grinding building which adjoins the material storage building will be 65x200 feet. The machine, blacksmith shops, store rooms and oil house building is a continuation of the main grinding building and occupies a space of 65x80 feet and on the east end of the grinding building an addition will be erected to house the crushing plant; this building will be 42x42 feet.

The limestone quarry is located immediately adjoining the plant and on the south side, with little or no overburden. These limestone deposits may be described as being of the "Palaeoric-Silurian" formation and of the Corniferous strata. The separation of stratas and layers is very pronounced and the stone when blasted breaks into small pieces which make very suitable feed for a large hammer mill, thus avoiding preliminary reduction through a large crusher.

The stone will be drilled by deep well drills, electrically operated, loaded on to two-yard steel self dumping cars by means of a two yard electric shovel, brought up the incline by automatic controlled electric hoist and dumped into a receiving hopper, which discharges onto a steel conveyor thence to hopper of hammer mill where it is reduced to 1-2 inch in size and under. From the hammer mill discharge it is elevated either into storage or onto a longitudinal belt conveyor which in turn serves the compartment tube mill bins. These bins are designed with a capacity of 30 hours continuous run. The crushed stone from the hammer mill will be delivered to these bins during the day operation of the quarry and the surplus will go to storage for night, Sunday and bad weather operation.

The clay deposits are located on the north side of the plant and within 1,000 feet of the mill. Clay will be excavated by means of a ¾ yard electric shovel. The original plans of the company called for transporting this material to the mill by means of two yard self dumping steel cars. This has however been changed and the clay will be washed at the clay pit and flow by gravity through a 10 foot wrought iron pipe line to the plant, the clay pit being at an elevation of approximately 70 feet above the plant, and stored into concrete storage tanks which will be provided with automatic drains to remove the surplus moisture.

The crushed stone is fed from tube mill bins by means of an automatic cradle feeder and thence to the feed



The Plant of the Toronto Cement Corporation, Limited.

trunion of tube mill. At this point the clay is added. The clay is pumped from the clay storage tanks to an 8 foot diameter steel receiving graduated measuring tank which is set at an elevation above the tube mills and which is provided with an automatic weighing discharge hopper electrically controlled and arranged so the clay is automatically weighed and controlled in ratio to the limestone required for proper mixture.

This mixture is fed by gravity into the 7x26 feet compartment tube mill, which is loaded with a minimum charge of 30 tons of steel balls, and ground to a fineness of 75 per cent passing the 200 mesh sieve and discharged into a receiving sump, then to 14 foot diameter steel feed tank for the 5x22 feet finishing wet tube mill where it is ground to a fineness of 95 per cent passing the 200 mesh sieve. The finished slurry from this tube mill is discharged by gravity to concrete, mechanically agitated, correcting tanks and if of the correct proportions pumped to any of the four 16x30 feet sampling tanks, corrections are found necessary in the mixture, the clay and slurry piping are so arranged with necessary cut-outs and by passes that additional clay may be added at either correcting tank. These tanks are separated by suitable connecting partition, and the corrected mixture can again be run through the finishing wet tube mill. In fact any combination can be worked out by the chemist that may be found necessary for a correct mixture, by this arrangement of correcting tanks, piping and sampling tanks. The slurry is then pumped to a series of steel storage tanks in the kiln building and in which provision is made for 36 hours operation, these tanks being connected in series and the slurry kept agitated by compressed air. From these tanks it is pumped to steel feed troughs over the rotary kilns and by means of ferris wheel feeders, operated by variable speed motors, discharged into the rotary kilns. There are suitable overflow pipes provided for the return of excess material to the pump sump pit. Centrifugal pumps operated by direct connected motors, provided with flexible couplings, will be employed to handle the clay and slurry. These are of special design and so arranged to handle mixtures low in moisture content.

The rotary kilns are in two sections, the main section being 11x175 feet and the secondary section 10x75 feet, each section being supported on two tires, and each section being independent of the other. The secondary section enters the main section 18 inches, the latter section being provided with a specially designed expansion joint with loose wearing rings held in place by compression springs equally spaced around the circumference of the kiln. These and the riding or wearing rings are all held in place by cast angle iron brackets made in segments and encircling the smaller section. The main kiln section is driven by a variable speed motor and so connected that the second section may either be operated at the same speed or if found advisable, operated at a slightly increased speed. The thought is in this arrangement, that at some future time the use of purchased power might be discontinued and waste gases from the kilns be utilized for steam generation. At that time the smaller sections can be utilized for other purposes and the 11x175 feet sections used for clinker production.

The clinker from the kilns is discharged onto a special type pan conveyor. This conveyor is encased on the top and the heated air from the clinker is therein reclaimed by means of an exhauster fan and subsequently delivered into the intake side of the pressure blower for preheating the coal and air mixture for calcining.

The top run of this conveyor is over the kilns, then runs vertically for a distance of 30 feet then on a horizontal, at this point discharging into weighing scales and from these to clinker storage.

Coal for burning is brought to the plant in standard gauge railroad cars and onto a receiving trestle which is 15 feet in height from top of rail, and dumped into storage. It is reclaimed by travelling crane and delivered to large receiving hoppers provided with automatic discharge cradle feeder. All incoming coal is purchased in small sizes. From the cradle feeder the coal goes to a belt conveyor which is provided with magnetic separator pulley, thence to coal drier bin, through the 5x40 feet indirect fired coal drier, which is fired with pulverized coal. Then it is elevated to bins above the pulverizers. The coal after being ground to required fineness will be delivered by Fuller-Kinyon pumps to the kiln coal bins and coal drier bin.

Gypsum will be delivered to the plant in hopper bottom cars and over

The Plant of the Toronto Cement Corporation, Limited.

a trestle and subsequently dumped and stored in gypsum storage in the materials storage building. Coal, limestone, gypsum and clinker will all be reclaimed and handled by means of a high-speed electric 15-ton traveling crane 80 feet clear span, and equipped with a two yard bucket. Provision has been made for a second crane runway underneath so as to provide auxiliary material handling methods.

After the clinker has become aged and hydrated, it is reclaimed by the crane and delivered into a large compartment bin, one of the compartments being arranged for clinker, the other for gypsum. A suitable amount of gypsum is delivered by the crane. The bottom of this bin is provided with automatic feeders and the clinker and gypsum are fed out into an automatic weighing scale. The weights are determined and regulated by the chemist and the mixture is delivered into the feed bin above the tube mill. The clinker grinding will be done by means of 7x26 feet compartment tube mills, loaded with a minimum charge of 30 tons of steel balls. The finished product of these mills will be ground to a fineness of 75 per cent passing the 200 mesh sieve and thence to two 14 foot air separators; the final product from these will be conveyed by air transportation to the cement warehouse and the "tailings" will be returned for further reduction.

The present temporary cement stockhouse will be equipped with longitudinal conveyors discharging into transverse conveyors. These in turn will discharge into an elevator, thence to packing bins and subsequently will be weighed and packed by automatic machines and then delivered onto belt conveyors and thence into the railroad cars for shipment.

The main tube mills will be driven by 500 H.P. direct connected synchronous motors, provided with magnetic clutches. All other machines and drives throughout the plant will be driven by individual motors direct connected through magnetic clutches. Power for the present will be supplied by the Ontario Hydro-Electric Commission, whose lines pass through the property. This power will be transformed down to 550 volts at the company transformer house located at the plant. The current used in the plant will be alternating, and the motors 3 phase 60 cycle.

The transportation facilities of the company are excellent and most unusual. The main line of the Canadian National Railway passes through the property and necessary connecting sidings have been constructed with that line. Arrangements are being completed for direct track connection with the Canadian Pacific Railway which main line passes through the southern boundary line of the property. The main Provincial Highway parallels the property and it is the intention of the company to build a standard concrete highway connecting this to their cement warehouse, thus providing for truck transportation and delivery of their finished product to such large consuming centers as Hamilton, London, Brantford and other important Provincial markets. This method of delivery thereby avoids the usual railroad delays and at the same time saves considerable rehandling.

The demand for Portland cement, particularly in Ontario, is rapidly increasing and the growth of the industry is illustrated in the fact that the Dominion production has increased from 317,066 barrels in 1901 to over 6,000,000 barrels in 1923. It is predicted that the completion of the Welland Canal, Toronto Union Station and viaducts, the proposed new St. Lawrence Hydro development, the Good Roads program together with the extensive new development of mining projects in northern Ontario, will all tend to overtax present cement production. The Toronto Cement Corporation Ltd. will occupy an enviable position in this rapidly developing industry when its new and modern mill is completed.

Mr. H. C. Shields, M.E. of Buffalo, N. Y. designed this plant and personally supervised the construction work so far completed. Mr. Geo. McCrea of Brantford, Ont. has been in charge as Construction Superintendent.

DINGS MAGNETIC APPOINTS

The Dings Magnetic Separator Company of Milwaukee, Wis., builders of magnets, magnetic pulleys and separators, announces the appointment of Mr. C. R. Considine as their representative in Iowa and Minnesota territory. Mr. Considine will handle this business from 1022 Langworthy St., Dubuque, Iowa.

How and When to Increase Output

Written Expressly for PIT AND QUARRY by R. N. VAN WINKLE

DOUBTLESS some of the operators of larger quarries have never been confronted with this question, but surely almost every operator of a moderate sized operation has at some time or other burned considerable mid-night oil in scheming and planning a successful solution of this often urgent question. It is urgent because there comes a time in the handling of every quarry proposition when seemingly every customer you have is hammering you on the back for stone and more stone, and invariably this condition comes in the summer season when the days are hottest and your organization has already been tuned up to the highest pitch of production activity. It, moreover, comes at a time when the operator by cutting down time for meals and by stressing every point to the limit of human indurance is trying to squeeze out an extra car or two of stone, realizing at the same time that such high pressure operating tactics cannot continue for any great or consecutive number of days without disastrous results or failure from machinery and organization morale. So a plan or scheme for relieving this high production tension and at the same time for increasing output is truly urgent.

Last season the writer, notwithstanding working as many as fourteen hours a day at one quarry, had the experience of finding that we were not even keeping abreast, but were actually falling behind daily in satisfying our orders during what we might call our peak season business period. A remedy for such a condition was imperative, and it might be of interest, if not helpful, to other operators who have found similar conditions to know the remedy we were able to apply, and quickly, and the line of reasoning followed which was the incentive for the remedy applied.

If given, for example, any quarry layout where daily production, assuming, of course, that you have your operation efficiently organized, is not ample to satisfy your sales requirements or demands there are two methods of solution; first, by increasing present capacity by the installation of bigger units of machinery and second, by the increasing of operating hours. Increasing capacity or output by bigger units of machinery sounds quite plausible and is on paper a simple solution, but if one has attempted to continue production and at the same time increase capacity by this method, he appreciates that it is more difficult than possibly building an entirely new plant and often leads one into encountering many unforeseen obstacles. It is not the intention to convey the idea that the installation of bigger and maybe more modern units of machinery is not an excellent means of increasing output, if conditions warrant, but if attempted remember that winter time, the non-operating season, is the logical time to remodel and increase capacity. It is the period when one has the time free from outside and inside complications and interferences. The second method, that of increasing operating hours to a point of using two or possibly three shifts of men, was finally accepted by us at our quarry as the cheapest, quickest and most plausible solution of temporarily increasing output and satisfying our sales requirements.

The greatest factor when considering output by the method of bigger and more modern units of machinery is to determine, without question, whether or not the potential business and territory served by the plant warrants a capital investment for increasing capacity, or if the condition of not keeping abreast or falling behind in the fulfillment of your orders is not due possibly to an abnormal flash demand for your products, due maybe to ideal weather conditions, suitable for the speeding up of construction work, or to a temporary boom, we will call it, in general construction activity, which as a rule is short lived and will quickly subside. Many bright men have been disillusioned by abnormal flash demands and temporary booms into increasing to awaken ultimately to the fact that in normal times their capacity is far in excess of what the available market will absorb. Such a condition means not only capital investment tied up, but additional interest, depreciation and carrying charges on an investment that is no longer of any use to you. The method of increasing operating hours to obtain greater output involves no capital investment, no

additional interest charges and no added depreciation or carrying charges, but calls for merely additional labor pay roll, which can be cut off promptly when the demand for your product decreases or becomes normal.

The writer has learned from his own experience as an operator, as well as by acting in a consulting capacity for other quarry and open pit operations, that too many operators overlook the possibilities of developing, by study and experiment, their present quarry and plant layout, but become imbued with the thought that something new, something bigger, some new arrangement, a change, is necessary and will be the cure for their operating and production troubles, when in fact a simple question of drilling, shooting, increased hour, transportation, stock piling, screening or some other like condition may be throwing their entire operation and production schedule out of balance. It is quite a simple matter for an engineer or a salesman to recommend new or bigger equipment at a greatly added expense to overcome operating and production troubles. It would be an easy matter, too, for a doctor or surgeon who might be called in consultation to recommend a new or bigger stomach, a new arm or a new leg for the patient, but the doctor knows such a thing is impossible. It is no more impossible than sometimes obtaining new capital for the purchase of additional equipment, or rebuilding your layout during a rush period of business. What does the doctor or surgeon do? He takes the patient as he finds him and by scientific treatment, or maybe an operation, brings him up his greatest capacity that is possible under the existing conditions. This is precisely what is needed in the quarry industry, more doctors, we will term them, qualified to diagnose quarry operating ailments and prescribe simple remedies, and fewer and less interference from salesmen and sales engineers who generally claim your layout is all wrong and needs bigger or more improved machinery, which is always manufactured or marketed by the company they happen to represent. What the writer himself, as an operator, is vitally interested in and can safely say, voices the sentiment of nine quarry operators out of ten, is the getting of the maximum tonnage and the cheapest operating cost with capital already invested.

There are unquestionably many quarries and open pit operations where near miracles could be accomplished along the lines of increasing output and reducing production costs if we would but take the existing layout and organization and proceed by investigation, experiment and personal contact to work over and improve what we already have into something efficient, thereby getting maximum production and the cheapest production costs possible out of present capital invested. One cannot but feel a genuine sympathy for the man who by tact, training, imagination, or otherwise, is able to take a losing proposition, a sick or lame operation, of whatever sort and develop it into something efficient and successful. Such a thing is not an act of Providence, but is being accomplished every day in different lines of industry.

If one can increase tonnage output at a time when increased tonnage is needed by increasing operating hours and eliminating additional investment or the troubles of rebuilding, it certainly is good sound business and worth considering. The question naturally arises, what about operating machinery twenty-four hours a day? Machinery does not get tired, and if you properly lubricate and maintain a steam shovel, a locomotive, an electric motor, or a crusher, or in fact any piece of machinery, there is no reason why it cannot be kept running twenty or more hours out of every twenty-four, provided it can operate to your advantage. It is admitted that it will wear out quicker operating twenty instead of ten hours in every twenty-four, but then on the other hand a piece of machinery has just about so many years of useful life in it and if this life is automatically crowded into a lesser number of years by operating or running it double time, profitably of course, the return on your investment is unquestionably more rapid and furthermore you are in the market quicker for new machinery of the latest and improved types.

The writer's slogan is to get the best out of what you have. It is a physical impossibility and common knowledge that new capital for expansion cannot be attracted to a going industry where fair returns on capital already invested cannot be shown. Of course we can plead obsolete layout, increased demand or re-

organization as reasons for wanting new capital, but I maintain that if we sometimes applied ourselves a little harder to working out the kinks and developing the sometimes latent possibilities of our present layout, we could surprise ourselves in the increased return on our investment and have no reason for seeking new capital; still, if we did not seek new capital, it would be easily obtained on the strength of our past record or performance.

There is no real formula for adequate and profitable production as far as the writer knows, no rule for perfection, no system no matter how fool proof or elaborate, which will operate successfully without the injection into it of a lot of real honest effort and hard work. Operating a quarry twenty out of twenty-four hours a day calls for a lot of real honest effort and hard work on the part of the man in charge of the operating, but offers a quick solution of an important problem, that of satisfying your sales requirements during peak season demands in an economical way. Too frequently the real solution of some of our most serious problems is found right at our feet or within easy reach, but due to this very fact we overlook it and seek a solution elsewhere, imagining the problem more complicated than it really is. Every executive, every operator and in fact every man who really does things will find obstacles in his way. The man who removes them, and not the man who evades them, is the man who is ultimately successful. At our quarry we tried operating day and night, as an emergency measure, as a solution of an embarrassing position we found ourselves in, and it was successful. It was expected that novel conditions would be encountered with night operations, not alone from the operation of machinery, but from the men, from illumination, from blasting, from costs and efficiency, which it is the writer's intention of covering in detail in a subsequent article.

FOOTE ADDITION

Mr. J. W. Hildebrand, formerly connected with the Jones Foundry and Equipment Company of Chicago, has recently joined the sales force of Foote Brothers Gear and Machine Company as sales engineer.

Recent Patents

The following patents of interest to readers of this journal recently were issued from the United States Patent Office. Copies thereof may be obtained from R. E. Burnham, patent and trade-mark attorney, Continental Trust Building, Washington, D. C., at the rate of 20c each. State number of patent and name of inventor when ordering:

1,523,435. Crushing and separating plant. Alexander G. George, Warren, Ariz.

1,523,478. Mill. Adolf Fischer, Hagen, Westphalia, Germany.

1,523,674. Grinding or crushing mill. John R. Torrance, Bitton, England.

1,524,000. Machine for treating sand and similar material. Verne E. Minich, New York, N. Y., assignor to American Foundry Equipment Co., same place.

1,524,001. Machine for treating sand and similar material. Verne E. Minich, New York, N. Y., assignor to American Foundry Equipment Co., same place.

1,524,020. Sand and gravel plant. George Conway, Bowie, Md.

1,524,100. Steam-shovel mechanism. Donald S. Mullin, State College Borough, Pa.

1,524,675. Crusher. Edwin B. Smith, Marion, Ind., assignor to Marion Machine, Foundry & Supply Co., same place.

1,524,734. Excavator and loader. Eldridge P. Douglass, Marianna, Ark.

1,524,871. Grinding-mill. Povl T. Lindhard, Brooklyn, N. Y., assignor to F. L. Smidth & Co., New York, N. Y.

1,525,151. Drag-line scraper apparatus. Harry A. Roe, Chicago, Ill.

1,525,300. Gravel washer and separator. William H. Herbert, Nashville, Tenn.

1,525,622. Gravel-washer. Fredrich Stocker, Highland, Ill.

1,525,919. Ore-grinding mill. John W. Cover, Seattle, Wash., assignor to Lode Dredge Co., same place.

1,526,074. Machine for treating sand and similar material. Verne E. Minich, New York, N. Y., assignor to American Foundry Equipment Co., same place.

1,526,075. Machine for treating sand and similar material. Verne E. Minich. New York, N. Y., assignor to American Foundry Equipment Co., same place.

Portland Cement Statistics January, 1925

The following tables, prepared under the direction of Ernest F. Burchard of the Geological Survey, are based mainly on the reports of producers of Portland cement. The January, 1925, totals include estimates for five plants. January production exceeds that of all corresponding months; shipments are slightly below those of a year ago but above those of January in all other years; stocks are far in excess of those usually on hand at this period and are exceeded only by those at the end of March, 1924.

The Bureau of Foreign and Domestic Commerce of the Department of Commerce, reports that the imports of hydraulic cement in December, 1924, amounted to 173,814 barrels, valued at $285,481. The total imports in 1924 amounted to 2,010,936 barrels, valued at $3,116,564.

Production, Shipments, and Stocks of Finished Portland Cement, by Districts, in January, 1924 and 1925, and Stocks in December, 1924, in Barrels

Commercial District	Production, January		Shipments, January		Stocks at end of January		Stocks at end of Dec.
	1924	1925	1924	1925	1924	1925	*1924
Eastern							
Pa., N. J. and Md...	2,382,000	2,267,000	1,384,000	1,006,000	2,830,000	3,749,000	2,488,000
New York	459,000	533 000	189,000	148.000	923,000	1,168.000	738,000
Ohio, W. Pa. & W. Va.	779,000	808.000	360,000	338.000	1,481,000	1,840.000	1,370,000
Michigan	299,000	208,000	196.000	188.000	814,000	986.000	966,000
†Wis., Ill., Ind. & Ky.	1,346,000	1,572,000	635,000	705,000	2,257,000	2,907.000	2,040,000
Va., Tenn., Ala. & Ga.	696,000	967,000	523,000	706,000	631,000	730,000	469,000
‡Eastern, Mo., Iowa, Minn. & S. Dakota..	960,000	711,000	296,000	332,000	2,518,000	3,117,000	2,737,000
Western Mo., Neb., Kan. & Okla.....	394.000	315,000	278.000	220.000	1,260,000	1,577.000	1,482,000
Texas	314,000	304,000	287.000	280.000	305,000	379,000	356,000
Colorado & Utah	61.000	80,000	70.000	55.000	261.000	341.000	316,000
California	922,000	1,075,000	898,000	987,000	373,000	558,000	470,000
Ore., Wash. & Mont..	176,000	76,000	94,000	143,000	502,000	368,000	436,000
	8,788,000	8,916,000	5,210,000	5,108,000	14,155,000	17,720,000	13,913,000

*Revised.
†Began producing and shipping June, 1924.
‡Began producing December, 1924, and shipping January, 1925.

Stocks of clinker, or unground cement, at the mills at the end of January, 1925, amounted to about 6,928,000 barrels compared with 5,433,000 barrels (revised) at the beginning of the month.

Production, Shipments and Stocks of Finished Portland Cement, by Months, in 1924 and 1925, in Barrels

Month	Production		Shipments		Stocks at end of month	
	1924	1925	1924	1925	1924	1925
January	8,788,000	8,916,000	5,210.000	5,108,000	14,155,000	17,720,000
February	8,588.000	.....	5,933,000	.....	16,815,000	.....
March	10,370,000	.....	8,995,000	.....	18,189,000	.....
First Quarter	27,746,000	.....	20,138,000	.....	.....	.....
April	11,726,000	.....	12,771,000	.....	17,159,000	.....
May	13,777.000	.....	14,551.000	.....	16,403,000	.....
June	13,538,000	.....	15,036,000	.....	14,903,000	.....
Second Quarter	39,041,000	.....	42,358,000	.....	.....	.....
July	14,029,000	.....	16,614,000	.....	12,319,000	.....
August	15,128,000	.....	16,855,000	.....	10,666,000	.....
September	14,519,000	.....	16,827,000	.....	8,404,000	.....
Third Quarter	43,676,000	.....	50,296,000	.....	.....	.....
October	14,820.000	.....	17,160,000	.....	6,073,000	.....
November	13,141.000	.....	10,289,000	.....	8,928.000	.....
December	10,435,000	.....	5,506,000	.....	*13,913,000	.....
Fourth Quarter	38,396,000	.....	32,955,000	.....	.....	.....
	148,859,000	.....	145,747,000	.....	.....	.....

*Revised.

Determining Financial Policies By Use of Financial Ratios

Written Expressly for PIT AND QUARRY by D. J. HUTCHINSON

AMONG the causes of business failures as reported by the credit agencies, insufficient capital heads the list with bad management, inexperience, extravagance and other causes trailing behind. That it takes money to do business would seem to be the first lesson in finance; yet it seems also to be the hardest lesson to learn, for the record shows that insufficient capital is responsible for more business failures than all other causes combined. Of course, it is apparent that insufficient capital is a secondary cause itself resulting from inexperience or bad management. Perhaps it should be said that the failure to provide sufficient capital is the error in management that most frequently leads to failure.

Almost the first question that the promoter of a business enterprise has to answer is, "How much capital will be required?" Nearly always the amount is under-estimated, and the venture fails for lack of capital to carry it through; or if it does not fail, a reorganization is necessary to provide the additional capital required. Such a reorganization is often the equivalent of failure so far as the original investors are concerned because the new capital usually takes the control and reaps the reward.

This error is very common in new enterprises, of which only a small minority ever get to first base, as it were. By far the greater majority of new businesses fail before they get really under way, according to the reports of the credit agencies, where the vital statistics of business are compiled. These statistics show a very large infant mortality among new businesses, and in the obituary which appears in the credit agencies' files the cause of death is most frequently ascribed to insufficient capital.

This disease of insufficient capital which brings so many infant enterprises to an early end is, like the measles, while primarily a children's disease, sometimes contracted by adults as well. Instances are all too common of old established businesses, which have been conducted profitably for many years, suddenly becoming cramped for lack of capital. These attacks usually occur after a program of expansion has been put into effect. In each case, with the old business as with the new, the trouble usually lies in failure to provide sufficient working capital. The promoter of a new enterprise usually estimates with great care and considerable accuracy the amount of capital required for investment in the plant and machinery. He then makes what he considers a liberal allowance for working capital. Experience shows, however, that this allowance is seldom liberal enough, particularly if the volume of business turns out to be anything like what was expected. For the peculiarity of the working capital requirements is that the more business one does the more working capital he requires, and this is just the contingency that many promoters of new enterprises fail to provide for.

This leads to the amazing but not uncommon spectacle of an enterprise embarrassed by too much business, a situation which is often as difficult to handle as that presented by too little business. This is especially true of the new enterprise. The old established business can ordinarily finance on credit any reasonable increase in its scale of operations. Credit is not so easily obtained by the new concern which for this reason must be in a position to meet its own working capital requirements. When the old established business suddenly increases its scale of operations by putting through a program of expansion, the same difficulty is encountered. Plans are laid to finance the necessary additions to plant and equipment. But the fact is often lost sight of that the additional plant and equipment meaning additional capacity mean also additional business that must be financed. Therefore the plan for expansion which does not provide additional working capital as well as additional fixed investment is almost certain to lead to disaster.

What often happens is that although the original plan provides for the increased working capital requirements, the cost of the improvements and extensions to the plant proves to be greater than was anticipated with

the result that the working capital is drawn on to meet the increased cost of the improvements. The writer has in mind one formerly very prosperous concern that got into exactly this position. The business had been in one family for three generations and had grown from three small machines in a little red shack to a pretentious face brick establishment covering a city block. The latest expansion, however, has put the company in a very precarious condition owing entirely to the exhaustion of its working capital. The new building and equipment cost almost exactly twice the original estimate. The deficit was made up out of the company's own working capital and its credit. The result is that its working capital has been turned into brick and mortar and its credit stretched to the limit to finance a beautiful plant which the company has at the moment practically no means of operating. Of course a refinancing program is under way, looking toward the funding of the current debt, placing the company again in a position to obtain credit. Meanwhile, however, the best of the year's business is passing into the hands of competitors and with it probably many customers whom the company has served for a quarter of a century and whom they may never be able to get back. How many years it will take the company to regain the lost momentum would be difficult to estimate.

Sometimes it is never recovered. The writer has in mind another instance of a company which got into a condition about like the one just described. A program of expansion was entered upon and a new plant built out of the proceeds of a bond issue. Again the cost of the improvements so far exceeded the estimates that the allowance for working capital was absorbed by the extensions. Lacking sufficient working capital to do the volume of business necessary to earn a return on the now greatly increased fixed investment the company faced almost at once the prospect of failing to meet the interest payments on the bonds. An effort was made to save the situation by calling on the creditors to accept preferred stock and on the common stockholders to purchase for cash, to provide working capital, preferred stock to the same amount as that issued to the creditors. The plan failed because the amount of working capital needed was again underestimated, and such amounts as were provided were rapidly consumed by the ineconomies of operating under the strained conditions. Finally the company did default on its interest payments and was thrown into a receivership. The trustee under the mortgage made it known that the plant would be given free subject only to the mortgage to any reputable concern that would take it over and operate it. The matter was suggested to one or two competing concerns but as the industry was by that time largely overbuilt, no one was found who wanted to assume the additional plant capacity subject to the heavy interest charges and attendant increased demands on his own working capital. One manufacturer stated that he would not consider accepting the plant under those conditions unless there was a million dollars cash working capital offered with it.

Instances of this sort are so common that they rarely attract notice except from those directly involved. Still each week brings a new crop of failures directly attributable to insufficient working capital. Whether such failures are avoidable is the problem that should concern every business man who is contemplating the launching of a new enterprise or any considerable expansion of an old one. He should check up very carefully on his answer to the question of how much capital will be required.

In the January 1st issue of Pit and Quarry we discussed to some extent the importance of balance sheet ratios in forming an estimate of the financial condition of a concern at the date of the balance sheet. Various ratios were discussed each of which, it was pointed out, gives some significant information as to one aspect or another of the company's financial position. The value of the financial ratios, however, is not restricted to their use in interpreting the financial statement. They form also the basis for determining many matters of policy in connection with the management and particularly in connection with the financial administration of the business. They may provide among other things an answer to the question of how much working capital is required to finance a given balance.

In the first place the promoter of the business knows what percentage of return he should earn on the total capital invested. If this investment is evidenced by bonds or preferred stock, the amount of return is usually fixed. The proper and necessary

return on common stock is not so easily determined, but the promoter knows at least about what returns must be shown in order to attract capital into that particular business. This furnishes, therefore, the first ratio which he must consider, that of net profit (P) to investment (I). This ratio may be expressed as follows, $\frac{P}{I}$

The other ratios that should enter into his calculations are:

a. The ratio of net profit (P) to total cost of sales (C). He will presumably have a fair idea at least of what his goods are going to cost him and what profit he may expect to make on their sale. This ratio of profit to cost may be expressed as $\frac{P}{C}$

b. The ratio of working capital (W. C.) to total cost of sales, or the working capital turnover. It is obvious that the amount of working capital required is dependent not only on the volume of business done but on the rapidity with which the working capital can be turned over as well. Thus a business that turns its working capital over only once a year will require ten times the working capital to do the same volume of business that will be required by a concern that turns its working capital over ten times during the year. The volume of business is necessarily measured in terms of the cost of the goods sold rather than in terms of sale to eliminate from the comparison the error that would arise from a different margin of profit in each instance. This ratio must be expressed as $\frac{C}{W.C.}$

c. The ratio of the working capital to total capital. This is the ratio that it is most often difficult to determine with the result that too much of the total investment is put into fixed form leaving an inadequate amount of working capital. Given the other factors, however, it is possible to check this ratio by the equation which will be developed below. This ratio may be expressed as $\frac{W.C.}{I}$

Conceding that it is the primary object of business to make money, the ratio with which the business man is primarily concerned is that of net profit to investment $\frac{P}{I}$. This ratio is equal to the product of the three ratios given in a, b, and c, above, as is proved by the following equation:

$$\frac{P}{I} = \frac{P}{C} \times \frac{C}{W\,C} \times \frac{W\,C}{I}$$

The truth of this equation can be shown algebraically by cancelling out the similar expressions as follows:

$$\frac{P}{I} = \frac{P}{C} \times \frac{C}{W\,C} \times \frac{W\,C}{I}$$

This leaves the self-evident equation $\frac{P}{I} = \frac{P}{I}$

The application of this equation to varying conditions is illustrated below.

$$\text{Case A } \frac{1}{4} \times \frac{4}{1} \times \frac{1}{10} = \frac{4}{40} = 10\% \qquad \left(\frac{P}{I}\right)$$

$$\text{Case B } \frac{1}{4} \times \frac{6}{1} \times \frac{1}{20} = \frac{6}{100} = 6\%$$

$$\text{Case C } \frac{1}{10} \times \frac{6}{1} \times \frac{1}{5} = \frac{6}{50} = 12\%$$

(a) (b) (c)

In Case A we have a concern earning a profit of 25% in the cost of sales, with a working capital turnover of 4 and a ratio of working capital to total investment of $\frac{1}{10}$. The net result is a profit of 10% on the total investment. In Case B the smaller ratio of working capital to total investment results in a smaller profit on the total investment although the rate of profit on cost of sales is the same and the working capital turnover is increased to 6 instead of 4. In Case C with a higher ratio of working capital to total investment a better net return is earned on the total investment, although the working capital turnover is not increased and the rate of profit on cost of sales is less.

From this it will appear that the amount of working capital required to earn a given return on the total investment depends on the rate at which the working capital is turned over as well as on the rate of profit on sales. Thus a concern with a relatively large fixed investment as compared to working capital must turn its working capital over much more rapidly, that it must do a much larger volume of business to earn the same net return at the same rate of profit on sales as the concern with a larger working capital ratio. For example, in Cases A and B a cost plus 25% contract would result in a net return of

10% on the total investment to firm A but only 6% to firm B although the margin of profit is the same in each instance.

The plan for financing any given business should be based on a knowledge of what volume of business will be done and at what rate of profit. The computation as to the working capital required to earn a given return on the total investment is then a matter of computation.

New Incorporations

The Prince Company of Camden, N. J., has been incorporated for $100,000, par 100 sub. 50,000, to manufacture concrete products, by George C. Prince, Camden, N. J., 400; George R. Prince, Camden, 50; Philip H. Prince, Camden, 50.

Tilette Cement Company has been incorporated in New York City to manufacture flooring. Capital $10,000. Incorporators: L. Urbach, J. H. Kalb, H. Raymond. (Williams & Urbach, 233 Broadway.)

Pearl River Gravel Company, Wilmington, Del., has been incorporated for $20,000. Delaware Registration Trust Company.)

Cincinnati Portland Cement Company, Wilmington, Del., has been incorporated for $2,030,000.

The Colorado Sand and Gravel Co. has been incorporated at Smithville, Bastrop county, Texas, with Charles Eichenbaum as president.

Simbroco Stone Co., Boston, Mass., has been incorporated with capital stock of $500,000 and 75,000 shares no par value, by George S. Wilbur of West Roxburg, Nathaniel F. Winchess of Melrose and Dexter B. Stratton of Dedham.

The Gordon Sand & Gravel Co., Inc., was recently incorporated at Denver, Colo., with capital stock of $200,000 by J. R. Gordon, W. B. Slife and R. M. Layton.

The Shope Brick & Cement Prod. Co. of Toledo has been incorporated for $500, by Wm. Casey and Earl J. Flynn.

The Virginia Portland Cement Company has taken over the Old Giant plant at South Norfolk, Ga., and is spending $750,000 in additions.

The Lehigh Portland Cement Company is making a total expenditure of $4,000,000 in the Birmingham district.

The National Cement Company is replacing its burned plant at Ragland, Ala., at a cost of a million.

The Phoenix Portland Cement Company is erecting a $2,000,000 plant at New Orleans.

Concrete Sand and Gravel Company, Inc., Baton Rouge, La., has been incorporated for $25,000.

J. J. Adams of San Bernardino, Cal., is establishing a rock crushing operation on his ranch.

The Carroll Land Company, of New Orleans, La., has been incorporated for $40,000 to develop immense gravel deposits at Avalon, La.

The Framingham Sand and Gravel Corporation has been incorporated at Framingham, Mass., this being a consolidation of The Goodrich Gravel Company of Holliston, and the Andrew Jensen Sand and Gravel interests.

The Fremont Sand and Gravel Company of Fremont, Neb., has been incorporated for $30,000 by A. A. Nehrbas, formerly of the Fremont Milling Co.; Clarence King, local building contractor, and Arthur Baldwin of the Baldwin-Heckes Insurance Company.

Koppel Opens New Sales Office

The Koppel Industrial Car and Equipment Company of Koppel, Pennsylvania, announces the opening of a new sales office in the Rialto Building, San Francisco, California, under the management of Mr. Harry C. Kraft. This new sales agency will be known as the Koppel Sales Company, Inc.

Both sales and engineering work will be handled by this office; the engineering to be under the management of Mr. A. E. Prager, who has had many years' experience in designing and perfecting cars for contracting and engineering purposes. The sales will be under the direction of Mr. Harry C. Kraft, as mentioned above.

This office has been opened with a view of better serving the many Koppel customers in the Western States and California, and thus assure them of the same whole-hearted cooperation as has been heretofore extended from the main office at Koppel, Pennsylvania.

The Koppel Industrial Car and Equipment Company will carry a large stock of material for immediate delivery at their warehouse located at San Francisco, California.

How to Buy Insurance

Written Expressly for PIT AND QUARRY by DWIGHT INGRAM*

THE day of the glad hand is almost gone.

Ask any old-timer to give you a picture of an insurance agent and he will draw for you a well-fed, cheery fellow, not overloaded with brains, with a flaming lodge pin in his lapel, supported by the friends who hand him their business because they have to have insurance and don't know what to do with it.

Fifteen years ago the lodge pin insurance agent began giving way before the golfing agent. Friendships were developed on the putting green, and the parasitical insuror drummed up business by judiciously letting his prospects beat him on the last hole.

But the big hand-shaker is out of date. And even the golfer is losing out. Insurance isn't being sold very much now-a-days on the golf course or at the club. It is being sold over the desk in the customer's office just like merchandise. And the insurance man "who knows his stuff" is getting the business away from the lodge brothers and personal friends. In some cases, true enough, the placing of insurance is influenced by an agent's help in introducing the producer to a new customer or by a favor at the bank. But to place your insurance in this way is dangerous. The safe business practice is not to mix the relationship of buyer and seller. I myself would not accept an order for insurance from my butcher or tailor, because if I don't like their service I want to be entirely free to demand fair treatment. Insurance, then, like machinery and supplies, is now being bought from the man who can deliver service, regardless of minor considerations, and it is sold not by threatening the insured with calamity and tragedy but by straightforwardly explaining risks, rates and the law of averages which governs fire, wind and accidents.

What should a man insure? Everything?—he can't. Everything he can afford to?—this would put a terrific overhead on a business, and probably much of the insurance would cost more than the actual risk was worth.

There are two classes of risk that may reasonably be insured. First are the big catastrophes such as fire, employer's liability for injuries to employees (workmen's compensation), liability for injuries to the public due to the operation of your business, and windstorm. Equally serious, but not affecting all plants, are flood, explosion, strike and riot, boiler explosion, life insurance indemnifying the corporation for the loss of the executive head. Any of these calamities which could possibly strike your plant would wipe out your entire business over night and cut off your income for at least a year. Any such risk must be insured regardless of cost as long as the rate charged is fair and correct. For no individual can carry his own risk of a catastrophe that would completely ruin him.

In a different class come those risks which might be termed "nuisance losses." These would not ordinarily mean bankruptcy for a firm, but they are serious enough to embarrass either smooth operation or the financial balance sheet. Such risks are covered by the following forms of insurance, among others: group life (covering the moral obligation to care for a dead employee's family to a limited extent), pay roll or office hold-up, engine or electrical machinery breakage, automobile fire and theft. These risks are very commonly insured, and rightly so, because a severe loss or a succession of minor ones would hamper a business and it usually shows a better financial administration to fix this expense through paying an insurance premium than to have the uncertainties of loss. But the rate and policy form should be more carefully scrutinized than is done before deciding to take out fire insurance. For "nuisance" losses can only be profitably insured if the rate is attractive, or if the insurance brings some real advantage in peace of mind or budgeting of overhead expense.

All buyers of insurance pay the same kind of premium. But what they get for that premium varies a great deal. All of them, of course, get a piece of printed paper folded like a legal document and promising to pay them something in case a designated accident befalls their plant. Whether this is all you get, or whether you get all the other features you are entitled to, you can decide from the following paragraphs.

*Engineer, Moore, Case, Lyman and Hubbard.

All insurance policies promise to pay losses, but occasionally some do not, because the issuing company has become insolvent. Then policy holders with unsettled claims are drawn into bankruptcy and the policy holders who have had no loss, if the insurer is a mutual or reciprocal and assessable, have to dig into their pockets and pay assessments. The first consideration in insurance is safety. Regardless of rate or personality of the salesman, an insurance policy is nothing but a useless piece of paper unless the company is catastrophe-proof. While everyone realizes the importance of solvency and safety in an insurance company, not all know how to judge it. During this winter one of the Middle West's largest reciprocals has gone into receivership. Just before this happened its financial statement was widely published and accepted as including an adequate reserve. Also its policy-holders included some of the largest manufacturers, which punctures the excuse that "if it's safe enough for such a firm it's good enough for me." So it is hard, but not impossible to estimate the worth of an insurance company. Its financial statement is usually good evidence; its general reputation through the country is also worth investigating. If cheapness or low rate is the principal selling argument of a certain company, find out why—the underlying reason behind the price. Usually the cut rate company is slow and tight-fisted in its adjustment of losses or it operates on a "Ponzi" method of depending on a constantly increasing volume of premiums to pay the back losses. Suppose the average overhead of an insurance company is 30 per cent. Then a company which claims to write business uniformly at 20 per cent below the market rate is undertaking either to give poor service on losses or to cut the overhead expense by two-thirds. To curtail loss payments is bad for the insured, and to cut the cost of operation so much must mean that the insurance company is directed by a group of financial geniuses greater than Morgan, Dawes and Babson combined. When an insurance solicitor says "cheap," be on your guard, but don't be prejudiced against him. If his company is poor, its reputation will catch up with it. And the apparent cheapness may be contingent on some skillful fire or accident prevention engineering work which will make your plant safer and thereby entitle you to a lower rate from the standard companies.

Most people do not get enough for the insurance premiums they pay. They are satisfied if the agent sends them a calendar every Christmas and supplies them with blotters occasionally. The average buyer doesn't know what else he is entitled to or what else he might reasonably ask for. The insured should realize that the percentage of each premium which goes to the agent or broker is not so much a salesman's commission as it is a service charge for taking care of the account and seeing that the policies and rates are right.

What you can fairly ask your insurance agent to do in return for the commission he gets is approximately as follows: Read every policy before delivering it; make a monthly inspection of the plant for the sake of fire and accident prevention and to look for any important changes that would require alterations in the policy forms; make at least an annual check of rates, amount of insurance and kinds of policies. In detail, these duties are considered in the following paragraphs, because a great many buyers of insurance do not insist on getting all of these forms of service.

It sounds ridiculous to caution an agent to read over policies that are written in his own office. Yet the caution is necessary. Even a large general agency with a specialized staff of experts is liable to make an error of more or less importance in about one out of every twelve or fifteen policies written. All brokers and agents are careful to see that they give the order correctly to the stenographer or policy writer, but there are only a handful of careful agents that actually read even the key points on every finished policy. This is vital, because all of the policies covering the same property should be exactly alike, and after loss has occurred it is too late to remedy any errors or make any changes.

The commission which the agent gets out of your premium entitles you to a certain amount of his time. The most profitable way that he can employ this time is to make a monthly inspection of your plant. An outsider will see many things that the superintendent overlooks, simply because the man on the job gets used to things as they are and doesn't realize the need of change. The agent can look for oily rags, can examine fire extinguishers and water barrels,

can check up on the guarding of machines and the condition of railings and fences, and otherwise pass judgment on the safety of the plant. Also, the producer will occasionally build a new shed, install new machinery, or make some other improvement that requires a change in the insurance policies. The producer is too busy with his routine work to become an insurance expert, and the agent should be "on the job" frequently enough to detect these changes and take the initiative in amending the policies.

The major part of the direct contact between producer and insurance agent can be arranged to fall during the winter or dull season, at a time when the producer is not operating his plant and when he can afford to do some thorough studying of the big items of overhead expense. It may be advisable to have all or most of the insurance expire at this time, because it is somewhat more convenient to make changes in policy form at the time new contracts are issued, and because the bookkeeping and handling of policies can thus be kept out of the operating season. The determining factor in this matter of expiration date, however, is your bank balance. There is some month in the year when your biggest customers pay up and your financial problem is easiest. This is the time when you should have your insurance bill come due. If the whole bill is too big to be conveniently absorbed in one month, have a part of the insurance expire in each month that you want to make a payment. Your agent can arrange this by writing your next policies so that they will expire in any desired month, and thus the system will be automatically established for next year. As I go through plant after plant I find policies expiring in April, July, September, any month. Asked why, the producer says that was the month when the plant was built and the policies have just been renewed from year to year. A little effort on the part of the agent in rearranging the expiration dates, and all the machinery of bookkeeping and paying of premium could be changed to fit the convenience of the insured.

The first job for the insurance agent in his annual conference should be to find out whether the insurance as written actually fits the present conditions of your business. That it did when it was first written, we can assume. But you are constantly making changes; a going concern cannot stand still. Your financial condition or your executive organization may have changed so that you now need business interruption or business life insurance where you did not a year ago. You may have installed new equipment which would make engine breakage or electrical machinery insurance a valuable safeguard. You may have started paying your men by check instead of cash and can afford to cancel your hold-up insurance. Or you may have made alterations in a building or added a new section, which means that the description of your property appearing in the policies must be amended.

Then there is not only the problem of kinds of insurance to carry and of the proper form of policy, but also the readjusting of the amount of insurance. Every year you write off depreciation, and every year you make repairs and additions. These two items must be balanced against each other and the insurance reduced or increased according to the result of your calculation. It is dangerous to be underinsured simply through failure to make this periodical check-up. At the same time it is a waste of money to be overinsured, for you never can collect more than the actual depreciated value of your plant at the time of loss.

Finally, the annual conference should include a full discussion of rates. The rates charged by the large, standard stock companies on fire and compensation insurance, for instance, are not blind guesses. They are assessed according to a regular schedule and are determined by the physical condition of your individual plant. The insurance agent should bring to you a copy of the state bureau's survey of your plant showing in detail the make-up of your rates. From this you can see for yourself whether any mistakes have been made in adding up the charges (such mistakes do occur), and you can decide whether you can afford to make improvements in your plant with the object of reducing your rate. This analysis of the bureau's survey is your guarantee that you are getting sound insurance at rock bottom cost; it is a better check on the situation than is the mere word of your agent or of any competing salesman.

An insurance policy is a contract. The insurance company and agent have definite obligations to pay your

losses and give you service as outlined above. But the buyer of insurance also undertakes to do some things, and the contract is not valid unless he lives up to his end of the bargain. The first duty is to give the agent accurate information about your plant. No producer is likely to lie deliberately in this respect, because almost all business men are honest. But if the agent misunderstands what you want and makes out the policy wrong, with an incorrect description of your property or the amount of insurance, this leaves your insurance practically as weak as if you had lied. Two or three provisions of the standard policies are also worth noting. In fire insurance the policy provides that it is invalid if you increase the hazard without the company's permission, if you make any unusual alterations to a building or any change in a division or fire wall, or if any portion of the building collapses. It is vital to report any of the above changes to your agent at once so as to get the company's acknowledgment of what has happened. Liability policies, including workmen's compensation, public and automobile liability, require that you give immediate notice of any accident covered by the policy. As frequently happens in the case of a minor accident, a workman may scratch his hand and go right back to work after the cut has been dressed, or a truck driver may knock over a child who gets up and runs home saying he feels all right. Persons injured in such ways occasionally have serious consequences (blood poisoning or nervous breakdowns, for instance) which may not develop for some time after the accident. And more often the injured person, being usually poor and of limited moral intelligence, gets into the clutches of an unscrupulous lawyer who will develop a fictitious case in the hope of getting fifty per cent of any damage award. So the only safe course is to report every accident that comes to your attention, no matter how slight. It is better to spend a few cents on mailing accident reports than to give the insurance company a loop-hole to say that the policy is void because you did not fulfill your part of the contract in giving notice. Another point of friction sometimes on liability insurance is that the insured should never agree to any settlement which binds the insurance company. If your car damages the fender of another and the injured party says he will let you off for, say, $5.00, do not pay him. The insurance company may reimburse you, but the policy says that you must not admit your liability or agree to settle without the consent of the company. It is obvious that the company feels it can handle its own losses more efficiently than a private citizen who lacks a broad experience in such matters.

Finally, for safety's sake, keep an adequate inventory and appraisal of your plant in an iron safe or in a bank vault. Some states make this a requirement of the policy. In any case it is good practice, because if you hope for a prompt and satisfactory adjustment of your big losses, be assured that nothing makes such a favorable impression on an adjuster as an intelligent and fairly accurate appraisal. If this record is kept up to date, the adjuster is not likely to find any ground for objection or argument over your claim and can pay your loss immediately.

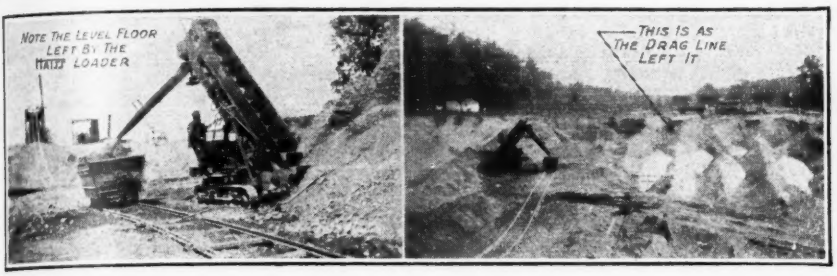
Buying insurance efficiently is a science. It is not difficult to learn and it is worth serious study to try to get the most for your money from a part of your overhead that may run as high as eight per cent of your invested capital. The producer who finds out after a loss that he had no insurance or that his policies were written wrong has only himself to blame, and should deserve censure rather than sympathy. For failure to take seriously the buying of insurance may cost you your business some day.

CEMENT BIDS FIGURES VARY

Imports from Europe into California are believed to have caused variation in bidders' figures for the first time in years. In requesting bids on 50,000 barrels of cement for the San Francisco harbor, four companies submitted offers whose figures were not identical almost to the cent. Two were alike, and others gave different figures. Recently cement has been coming in from Denmark and Belgium.

NEW AMERICAN CATALOGS

The American Hoist and Derrick Company of St. Paul, Minnesota, have a new General Catalog Crane Catalog ready for distribution.



A HAISS TRUCK LOADER

Replaces a drag-line scraper

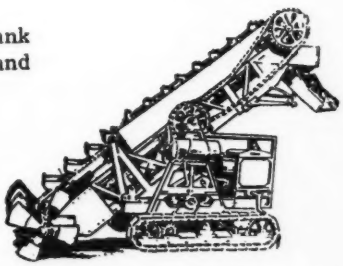
The Triangle Sand Co., Mamaroneck, N. Y. could not get out more than 50-75 yards of sand and gravel a day, with their drag-line scraper. And the scraper outfit left the bottom of the pit in hills and valleys (see illustration above) which was distinctly bad, because the property will in a few years be used for a residential development.

A Haiss Creeper Truck Loader raised the output to 200-300 yards a day, cut a width of 45 feet with one track set up and left the ground in good level condition.

The machine is fitted with a long swivel spout and loads into a 2 yard dump car. The car is loaded in 2 minutes and is hauled up a 300 ft. industrial track to the hopper. It takes 2 minutes for the one car to make a round trip—so the Loader is operated only 50% of the time, or 50% of its possible capacity.

Note that it is digging in a 12-foot bank and that the only labor is one operator and one man breaking down the bank.

Only a big, strong, powerful Haiss Loader has capacity to swing a job of this kind.



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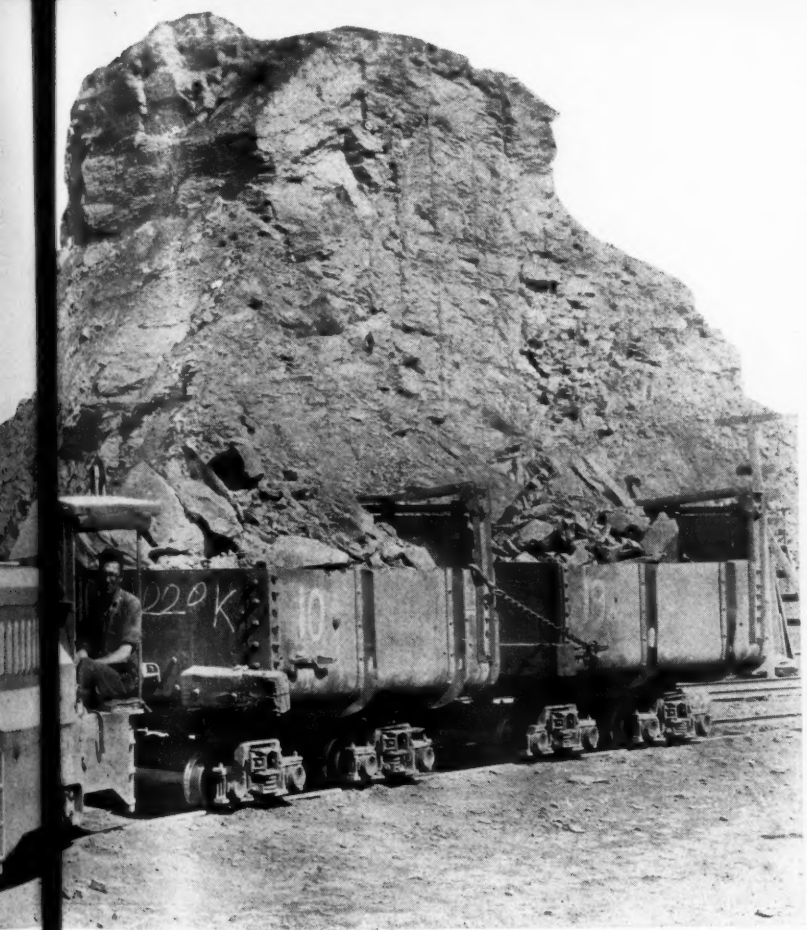

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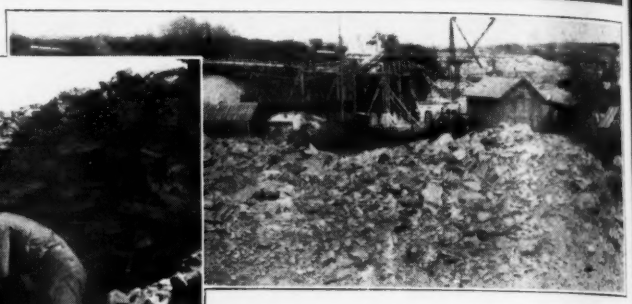


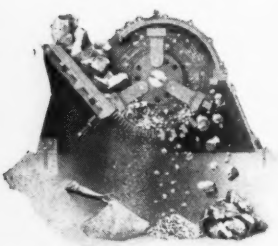
Quarry of E. P. Jones. Photo to the left shows size of rock he is reducing to 1½" with his Williams hammer crusher.

"No. 5 Jumbo crusher working fine, takes quarry run stone from spalls to 24". Capacity 100 to 125 tons per hour when crushing to pass 1½" ring. Product as good or better than that produced by former jaw crushers. Frozen or damp stone makes no difference to the Jumbo."

E. P. JONES, FLORENCE KANSAS.

24" Rock to 1½" with One Crusher

By handling larger rock and reducing to the required size in one operation—one crusher doing the work of two or three—Williams hammer crushers cut plant investment 50% or more. Have also reduced crushing costs 35% to 53%. The above photo shows the size rock handled by the Williams crusher at the E. P. Jones quarry, Florence, Kansas. Finished product all passes 1½" ring. As regards "fines," Mr. Jones states the product is at least as good and possibly contains less "fines" than his former jaw crushers. Nor is his machine choked by wet or frozen stone. List of nearby plants where Williams hammer crushers have reduced investment and crushing costs gladly sent. Write us.



Cross sectional view of Williams hammer crusher showing how any size rock can be made by proper adjustment.

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PATENT CRUSHERS GRINDERS • SHREDDERS

The Properties of Aluminate Cement and Methods of Utilization

By Roger L. Morrison*

ALUMINATE cement is made from limestone and bauxite, the latter material being high in alumina and taking the place of the clay used in the manufacture of Portland cement. The outstanding properties of this cement are very high strength which it develops in twenty four hours and its power to resist the chemical action of sea water and certain underground waters encountered in tunnels. It is also stated that aluminate cement is less affected by freezing temperatures before it has set up than is Portland cement.

Both American and European chemists have been investigating the possibilities of aluminate cement for approximately twenty years but it was first developed upon a commercial scale by M. Jules Bied, Technical Director of Ancienne Societe J. & A. Pavin de La Farge, France, and is being manufactured by this company under the name of ciment fondu. Apparently the first use of this cement was on railway tunnel work but it was brought to the attention of many engineers during the war when it was used in artillery foundations and for other work at the front where speed was of great importance. It is also used extensively in pavement repairs, particularly in Paris, and the present production of the La Farge Company is about 200,000 barrels annually.

Probably the first experimenting in this country along the lines of the development of aluminate cement was by Mr. H. S. Spackman but nothing was done commercially until last year, when the manufacture of aluminate cement was begun by the Atlas Lumnite Cement Company. As this is the only aluminate cement made in the United States at present, the investigations now being conducted at the University of Michigan are necessarily confined to that product.

This investigation was not begun until about three months ago so that our problem was to get as much information as possible in a short time. For this reason the tests are perhaps not as logically arranged, and are certainly not as complete, as they would be if the time had not been so limited.

The tests made to date include chemical analysis, specific gravity, fineness, soundness, and setting time of the cement, tension and compression tests of cement mortar, compressions tests of concrete, bond between aluminate and portland cement mortar, and setting time of mixtures of aluminate and portland cement. In most cases, check tests using portland cement were made at the same time and by the same operators, as a basis of comparison.

The chemical analysis of a sample of aluminate cement was as follows:

	Aluminate Cement	Portland Cement*
SiO_2	8.50	19-25
FeO	18.34	2-4
Al_2O_3	37.24	5-9
CaO	31.60	60-64
MgO	1.13	1-5
SO_3	1.47	1-2
Loss	2.08	-4

*For comparison.

It will be noted that this cement is much higher in alumina and also in iron than portland cement, while its lime and silica contents are much lower.

The results of physical tests on several samples of aluminate cement were as follows:

Specific gravity—
Sample No. 1.....3.137
Sample No. 2.....3.128
Average 3.132
(A. S. T. M. Portland Cement specifications, Min. 3.10).

Fineness—(Retained on 200 mesh sieve)
Sample No. 1..17.0 per cent retained
Sample No. 2.. 6.0 per cent retained
Sample No. 3.. 5.7 per cent retained
Average ..... 9.6 per cent retained
(Portland Cement specifications, maximum 22.0 per cent.)

Soundness—O. K.

Normal consistency 21.6.

Setting time—Initial, 6 hours, 38 minutes.

*Paper presented by Roger L. Morrison, Associate Professor of Highway Engineering, University of Michigan, and Director, Michigan State Highway Laboratory, at the Eleventh Annual Conference on Highway Engineering at the University of Michigan, Ann Arbor, on February 18, 1925.

(Portland Cement specifications, minimum, 1 hour)

Final, 8 hours, 8 minutes.

(Portland Cement specifications, maximum, 10 hours.

Tension tests were made using standard sand under varying curing conditions which would most nearly represent construction conditions, also a standard test using natural sand. Table one shows the results of these tests.

The mortar compression tests were made upon 2"x4" cylinders and 2"x2" cylinders, the composition and curing conditions being the same as in the case of the tension tests. The last set of briquettes and cylinders was broken at 83 days because if they ran longer, the results would not be available at this time. Results are given in Table II and portland check test results in Table III.

In making the concrete compression tests, a bank-run gravel was screened into separate sizes and then remixed in predetermined proportions so that the aggregate in the various cylinders would be as nearly uniform as possible. Table IV shows the properties of the aggregate after it was remixed ready for use.

Table V shows strengths obtained using various mixes and slumps, all cylinders being cured in moist air. Table VI shows strengths at 4, 5, 8, and 29 days under various curing conditions. Tables VII and VIII give the results of check tests using portland cement. All cylinders were 6"x 12" in size.

TABLE I.

TENSION TESTS, 1:3 MORTAR

Pounds per square inch.

Age	Standard Ottawa Sand: 1 day moist air, rest dry		2 days moist air, rest dry		3 days moist air, rest dry		Natural Sand: 1 day moist air, rest water	
	Lumnite	Portland	Lumnite	Portland	Lumnite	Portland	Lumnite	Portland
1 day.....	360	113	...	...	...	...	492	165
2 days....	320	127	415	183	...	...	...	...
3 days....	...	...	333	187	...	...	673	292
4 days....	388	172	353	162	363	178	...	...
7 days....	...	...	...	...	...	...	635	352
28 days....	...	270	382	332	507	413	690	540
83 days....	417	369	395	...	...	...	...	...

TABLE II

COMPRESSION TESTS, 1:3 MORTAR

Aluminate Cement

Pounds per square inch.

Age (days)	Standard Ottawa Sand: 1 day moist air, rest dry		2 days moist air, rest dry		3 days moist air, rest dry		Natural Sand: 1 day moist air, rest dry	
	2x4 cyl.	2x2 cyl.	2x4 cyl.	2x2 cyl.	2x4 cyl.	2x2 cyl.	2x4 cyl.	2x2 cyl.
1	6125	6340	....	....	....	....	6072	7144
2	....	6414	5624	5668	....	....	....	....
3	....	....	5730	6656	....	....	6252	8211
4	6220	6741	5605	5621	5297	6581	....	....
7	....	....	....	....	....	....	4798	7167
28	....	7195	....	7131	....	7112	6082	9145
83	....	7094	....	7097	....	....	....	....

TABLE III.

COMPRESSION TESTS 1:3 MORTAR

Portland Cement (For Comparison)

Pounds Cement (For Comparison)

Age (days)	Standard Ottawa Sand: 1 day moist air, rest dry		2 days moist air, rest dry		3 days moist air, rest dry		Natural Sand: 1 day moist air rest water	
	2x4 cyl.	2x2 cyl.	2x4 cyl.	2x2 cyl.	2x4 cyl.	2x2 cyl.	2x4 cyl.	2x2 cyl.
1	647	677	....	....	....	....	843	1037
2	1047	1167	1143	1183	....	....	....	....
3	....	....	1340	1483	....	....	2190	2342
4	1630	1650	1550	1863	1247	1747	....	....
7	....	....	....	....	....	....	3117	2610
28	2060	2163	2330	2457	2597	3120	....	3950
83	....	....	2667	2853	....	....	4257	3690

TABLE IV

Properties of Aggregates Used in Concrete Cylinders

Material—Bank run gravel, screened and remixed.
Weight per cu. ft.—122 lbs.
Voids—22.6 per cent.
Abrasion test:
Plain cylinders:

Test No. 1, percent of wear	5.6
Test No. 2, percent of wear	6.7
Average	6.2

Slotted cylinders:

Test No. 1, percent of wear	10.7
Test No. 2, percent of wear	11.8
Average	11.2

Objectionable particles—1.6 percent.
Mechanical analysis:

Screen	Percent passing
1½ inch	100
1 inch	82
¾ inch	71
½ inch	54
¼ inch	37
8 mesh	33
10 mesh	32
20 mesh	26
30 mesh	18
40 mesh	14
50 mesh	7
80 mesh	4
100 mesh	3
200 mesh	0.5
Clay and silt	1.5
Screen	**Percent coarser**
100 mesh	97
48 mesh	92
28 mesh	79
14 mesh	72
8 mesh	67
4 mesh	63
⅜ inch	50
¾ inch	26
1½ inch	..
Fineness modulus	5.46

The most interesting property demonstrated by these tests is the very high strength attained by aluminate cement at 24 hours, the strength being greater than that of portland cement at 28 days. Maximum strength seems to be reached at from three to five days. The strength of the best 1:2:4 aluminate cement concrete at five days was almost exactly twice as great as the strength of the best 1:2:4 portland cement concrete at 29 days.

It is frequently stated that aluminate cement requires more water than portland cement, but the results of these tests are not in accord with that statement. The strength of the aluminate concrete was, in practically all cases, inversely proportional to the amount of water used. When the strengths are plotted, the curves representing the various slumps are approximately parallel lines, the greatest strength occurring with the use of the smallest amount of water. It took practically the same amount of water to produce a given slump with aluminate cement as with portland cement.

When the strengths of the various mixes are plotted so as to show the relation between the strength and the per cent of cement in the mix, the resulting curves are practically straight lines except for a break at the 1:2:3½ mix. This refers to the 24 hour strength only, as the investigation has not included sufficient tests, as yet, for the determination of these relationships at later periods. At 29 days a 1:4:8 aluminate cement concrete has about the same strength as a 1:3:6 portland cement concrete, while 1:3:6 aluminate is about as strong as 1:2:4 portland.

Absence of moisture during the curing period seems to have much less effect on aluminate cement than upon portland cement. In fact, in almost every case the cylinders cured in dry air were stronger than those cured in moist air, the average difference in strength being 7 per cent.

In nearly all cases where the unit crushing strength was more than 4,000 pounds the aggregate was fractured.

An important question when aluminate cement concrete is used in connection with portland cement concrete is the strength of the bond between the two materials. Six half-briquettes of portland cement mortar were replaced in the molds and the rest of the space filled with aluminate cement mortar. The new briquettes formed in this manner were broken at the end of 24 hours and showed bond strength of 280, 125, 325, 240, 95 and 190 pounds per square inch, or an average of 209 pounds per square inch. In one case, about half the fracture was through the old portland mortar instead of being all at the bond.

Many discussions of aluminate cement state that it cannot be mixed with portland cement without causing a flash set. Results of setting time tests made upon such mixtures are given in Table IX and indicate that flash set does not occur unless the proportion of portland cement falls between 33 per cent and 90 per cent of the mixture.

The tentative conclusion to be drawn from this investigation is that the American aluminate cement, like the European product, is well adapted for use in highway work. While its high cost (about three times that of portland cement) tends to limit its use as a general constructive material, it seems to be well adapted for repair work, and for use in situations where it is urgent that traffic delay be reduced to a minimum. It should be possible to open patches to traffic the day after they are placed, thus eliminating the inconvenience and great danger of barricades and the difficulty of keeping the patches moist during curing. Apparently there would be no difficulty in obtaining a secure bond between the patch and the old pavement. Several state highway departments have constructed experimental sections of aluminate cement concrete pavement and opened them to heavy traffic the following day without serious injury.

Before final conclusions can be drawn it will be necessary to make long time strength tests, abrasion tests, modulus of rupture tests, etc.,

TABLE V

Compression Tests of Concrete
Aluminate Cement Cylinders, Cured in Moist Air
Strength in pounds per square inch

Mix	Percent Cement	Slump	1-day	3-days	4-days	5-days	8-days	29-days
1:4 :8	.... 7.7	1″	843	....	....	....	....	....
1:4 :8	.... 7.7	4″	456	1589	1324	1242	1218	1111
1:4 :8	.... 7.7	6″	450	....	....	....	....	....
1:3 :6	....10.0	1″	2160	....	....	....	....	....
1:3 :6	....10.0	4″	1157	3137	2375	2344	2073	2325
1:3 :6	....10.0	6″	690	....	....	....	....	....
1:2 :4	....14.3	1″	4537	5035	5040	5091	4789	5109
1:2 :4	....14.3	4″	4187	4973	4747	5349	4615	4856
1:2 :4	....14.3	6″	3222	4626	4079	4495	3742	3943
1:2 :3½	....15.4	1″	5203	....	....	....	....	....
1:2 :3½	....15.4	4″	4728	....	....	....	....	....
1:2 :3½	....15.4	6″	4133	....	....	....	....	....
1:1½:3	....18.2	1″	5731	....	....	....	....	....
1:1½:3	....18.2	4″	5052	....	....	....	....	....
1:1½:3	....18.2	6″	4523	....	....	....	....	....
1:1 :2	....25.0	1″	6449	....	....	....	....	....
1:1 :2	....25.0	3″	5491	....	....	....	....	....
1:1 :2	....25.0	6″	5846	....	....	....	....	....

TABLE VI

ALUMINATE CEMENT CYLINDERS
COMPARISON OF CURING METHODS

	Mix—	1:2:4	1:2:4	1:3:6	1:2:4	1:4:8
Age—4 days.	Slump—	1″	3″	6″	3″	3″
1 day moist air, 3 days dry air..		5406	5092	4530	2589	1429
2 days moist air, 2 days dry air..		5105	5160	4496	2549	1410
4 days moist air.....		5040	4747	4079	2375	1324
Age—5 days.						
1 day moist air, 4 days dry air..		5289	5096	4967	2533	1447
2 days moist air, 3 days dry air..		5846	5025	4520	2752	1459
5 days moist air.....		5091	5349	4495	2344	1242
Age—8 days.						
1 day moist air, 7 days dry air..		5007	5498	3884	2431	1647
2 days moist air, 6 days dry air..		5482	4855	3651	2479	1526
8 days moist air.....		4789	4615	3742	2073	1218
Age—29 days.						
1 day moist air, 28 days dry air.		4679	4946	4139	2517	1583
2 days moist air, 27 days dry air.		5338	4969	4011	2397	1552
29 days moist air.....		5109	4856	3943	2325	1111

Relative strength all mixes

	4 days	5 days	8 days	29 days	Average
1 day moist, rest dry.....	108	104	112	103	107
2 days moist, rest dry.....	107	106	109	105	107
Total time moist	100	100	100	100	100

and in the meantime the opportunities for observing the behavior of this material under actual service conditions are constantly increasing.

The writer wishes to express his thanks to Messrs. H. S. Spackman, P. H. Bates, Edwin C. Eckel, and to several other American and French engineers who have studied and used aluminate cement, for the valuable information and suggestions which they have given him; to Mr. M. H. McGaffigan for making the chemical analysis, and to the manufacturer for supplying the cement used in the investigation.

TABLE VII

PORTLAND CEMENT CYLINDERS, CURED IN MOIST AIR
STRENGTH IN POUNDS PER SQUARE INCH
(All 4-inch slump)

Mix	Cement	1-day	3-days	4-days	5-days	8-days	29-days
1:4	:8 .... 7.7	*	*	209	260	282	**589
1:3	:6 ....10.0	95	561	...	544	662	1205
1:2	:4 ....14:3	235	755	958	1144	1567	2705

*—Broke before load was applied.
**—Age 35 days.

TABLE VIII

CHECK TESTS ON PORTLAND CEMENT
COMPARISON OF CURING METHODS

Age, 4 days.	Mix—1:2:4	1:3:6	1:4:8
1 day moist air, 3 days dry air	901	512	232
2 day moist air, 2 days dry air	1067	524	249
4 day moist air	958	...	209
Age, 5 days.			
1 day moist air, 4 days dry air	906	565	269
2 days moist air, 3 days dry air	1147	523	247
5 days moist air	1144	544	260
Age, 8 days			
1 day moist air, 7 days dry air	1302	732	331
2 days moist air, 6 days dry air	1395	620	302
8 days moist air	1567	662	282
Age, 29 days.			
1 day moist air, 28 days dry air	1453	807	368
2 days moist air, 27 days dry air	2218	953	326
29 days moist air	2705	1205	*589

*Age 35 days

RELATIVE STRENGTH ALL MIXES

	4-days	5-days	8-days	29-days	Average.
1 day moist, rest dry	94	89	94	58	84
2 days moist, rest dry	105	98	92	78	93
Total time moist	100	100	100	100	100

TABLE IX

EFFECT ON SETTING TIME OF ADDITION OF PORTLAND CEMENT

Per cent of Lumnite	Per cent of Portland	Per cent of Water	Setting Time Initial (1)	Initial (2)	Initial Average	Final (1)	Final (2)	Final Average
100	0	21.4	6:00	6:45	6:23	7:50	7:00	7:25
90	10	23.0	4:09	3:55	4:02	4:54	4:45	4:49
85	15	23.4	3:00	2:45	2:53	3:50	3:20	3:35
80	20	24.4	2:40	2:50	2:45	3:40	3:45	3:43
75	25	25.0	3:23	2:40	3:02	4:23	3:25	3:54
67	33	26.0	2:23	2:15	2:19	3:53	3:15	3:34
60	40		Flash			Flash		
55	45		Flash			Flash		
50	50		Flash			Flash		
45	55		Flash			Flash		
40	60		Flash			Flash		
33	67	23.0				:03	:05	:04
25	75	23.0	:02	:07	:05	:08	:09	:09
20	80	22.8	:05	:04	:05	:09	:07	:08
15	85	22.4	:19	:17	:18	:27	:26	:27
10	90	22.4	2:30	1:50	2:10	4:05	3:30	3:48
0	100	22.8	4:10	4:45	4:27	6:10	6:15	6:13

The Diplomacy of Good Roads

Great economic advance for Latin America, directly promotive of increasing trade benefits for the nations of both continents, was pointed out by J. Walter Drake, assistant secretary of commerce, as the probable result of the forthcoming Pan American Roads Congress, scheduled to be held in Buenos Aires in May.

Commenting on the recent letter from the President requesting Congress to appropriate sufficient money to defray the expenses of delegates from this government to attend the Buenos Aires conference, Mr. Drake asserted that he is convinced that the coming meeting is a progressive movement of particular significance in South American economic development.

A simple combination of cement and gravel under the skillful handling of the engineering talent of the two continents may have a vast influence in the countries of our southern neighbors in bringing about a contented, happy people, and in promoting a prosperous domestic and foreign trade. Improved highways and motor transportation will be the direct means of such accomplishment.

Interviewed at Washington, Mr. Drake told very briefly the story of how this government first became interested in highway development in Latin America, tracing the steps which have now resulted in the desire of the President to send delegates to the forthcoming conference.

"Something more than two years ago," Mr. Drake said, "the fifth annual International Conference of Pan American States, held at Santiago, Chile, passed a resolution calling for an official Pan American Highway Congress. The director general of the Pan American Union asked the Department of Commerce for advice and assistance. Following a conference, called at the department, of leading representatives of the American automotive industry, it was decided that the best plan would be to invite a group of outstanding representatives of the Pan American countries to visit the United States as the guests of American industry to study at first hand our highways, highway construction, and motor transport. Other industries gladly joined in the plan and, with the help of the Department of State, some forty road engineers and experts selected from nineteen Pan American nations were invited to this country.

"Last May the delegation arrived in the United States. Under the direction of the officials of the Bureau of Public Roads, the party was escorted through nine states as the guests of governors and state highway departments. The itinerary followed was selected with a view to giving them approximately the same conditions of climate and soil as prevailed in their own countries. While they saw the highest type of modern road surfaces, most of their time was spent in states where a large part of the mileage is sand-clay, gravel and other light type roads.

"Questions of finance were discussed with experts. The visitors were shown our most modern road building machinery in operation. Particular attention was devoted to studies of the influence which the highway has exerted on living standards, health, suburban development, education and associated subjects. Government, industrial and public agencies everywhere along the line gave their full co-operation toward making the event a great success. The visitors found their American friends deeply and sincerely interested in their welfare. They gained much valuable first hand knowledge of American conditions, and in return left in the communities they visited a much better understanding of Latin America.

"The whole venture was so successful that at the conclusion of the trip the visitors voted to organize a permanent association to be known as the Pan American Confederation for Highway Education. It was agreed that national boards should be set up in each country. This was at the end of June, 1924. Since that time boards have been organized and are now functioning in Argentina, Cuba, Chile, Honduras, and Peru, with cabinet members and highway officials as personnel. Detailed reports of the observations made here have been printed in Uruguay, Costa Rica, San Domingo, Brazil, Panama, Guatemala, and the other countries of Central and South America. Road congresses have been held in Chile and Brazil. The press of Latin America has given splendid support to the practical benefits of the plan.

A Diagnosis of Your Business

By You

PHYSICIANS diagnose cases. They first examine the patient to get the facts. Next they give serious consideration to what has been gathered through tests and questions. From these conclusions they are then in a position to state what the trouble is and to outline a cure. The managing executive should diagnose his case the same as the physician does. He must analyze symptoms, local conditions, functional disorders and then prescribe the course of treatment.

The following questionnaire is intended to enable the responsible managing executive to diagnose rapidly his business and determine for himself its strength and its weakness. Each question covers a point in management technique which has been used to advantage by some producers in the non-metallic industries. Probably no organization consistently does all of these things. It is doubtful, however, if any successful organization consistently ignores them all. Those companies which rank among the better organized and more thoroughly managed will be found to have adopted a large percentage of the points of management covered. Those who have adopted only a small percentage will easily be found to be among the more poorly organized concerns.

Because a certain company is making money does not necessarily mean that it is well organized. It is, however, hard to find a well organized company that consistently loses money. It is generally true that a poorly organized company that is making money could make much more by better management.

The method of rating in a questionnaire of the character submitted here must, of course, be arbitrary. A more accurate measurement would require a different rating for each subject. Such a rating probably could not be made successfully. It would need to be different for each industry and even for each plant. The following arbitrary method of rating has the merit of enabling an executive to compare his organization with a hypothetical organization having the maximum possible rating:

A—Excellent—If you have the condition implied by the question, your rating is 4.

B—Good—If you think you have an adequate substitute, your rating is 3.

C—Fair—If you have decided to remedy the condition implied and have taken steps to correct the condition, your rating is 2.

D—Poor—If you have been aware of the condition implied but have not decided to correct it, your rating is 1.

E—Bad—If you are not aware of the condition implied or the plan mentioned, your rating is 0.

An organization is a group of individuals working together toward a common goal. Many plants in the non-metallic industries represent a group of individuals and hardly more. In order that a group of individuals may work together toward a common goal, it is essential that the duties of each be carefully determined and outlined. The most successful managing executives require that such duties be in writing and preferably graphically.

Questions:

1. Have you an active modern organization chart?
2. Has your organization been developed along functional lines or around individuals?
3. Are the duties of each member or unit of your organization in writing?
4. Have you a set of standard written instructions detailing how each unit is to be performed?

Maximum rating 16
Your rating .....

The best organizations now give serious consideration to the problem of selecting employees and the handling of them after they are employed. Good personnel practice is of major importance in the organization.

Questions:

1. Are employees selected by one individual or by a department?
2. Is evidence of ability required of applicant?
3. Are records kept of discharges and layoffs with causes tabulated?
4. Are incompetent workers given training or tried at other work before they are discharged?
5. Are those who quit investigated and causes tabulated?
6. Are employees trained under competent foremen or instructors as

to the best method of performing work?
Maximum rating 24
Your rating .....

Management today is based upon facts and statistics as well as upon individual judgment. There are many problems which can be handled by individual opinion, but reaching conclusions by a scientific process is more modern. Wherever facts can profitably be found, they remove many of the complications of management and make success more certain. Management by facts deliberately and systematically sought is responsible for the greatest successes in modern business.

Questions:

1. Have you a Research Department for products, materials or methods?
2. Have you a cost system operating in connection with your finances?
3. Do you regularly compare production performance with production standards?
4. Have you a record of idle equipment time with causes tabulated?
5. Have you a record of idle workers with causes tabulated?

Maximum rating 20
Your rating .....

Lack of proper maintenance of equipment and plant may be a great source of waste. In some instances the upkeep is left to the workmen.

Questions:

1. Have you an equipment inventory?
2. Is your equipment subjected to periodical inspection?
3. Have you a separate maintenance department?
4. Are records made of breakdowns with causes tabulated?

Maximum rating 16
Your rating .....

Purchasing is rapidly becoming a science. Years ago heads of departments and foremen did much of the buying; the buying function was not centralized. Scientific methods are good economy.

Questions:

1. Do all purchases go through a Purchasing Department?
2. Is material or equipment received subject to test or inspection when received?
3. Have you a perpetual inventory showing all stock receipts, issues and returns and a balance on each item?
4. Have you maximum and minimum limits on each item?

Maximum rating 16
Your rating .....

Production planning is a major function which is greatly neglected by producers and its neglect is a source of great waste.

Questions:

1. Have you an up-to-date layout plan of your plant?
2. Have you a budget of anticipated sales and production?
3. Have you established standards of capacity for your equipment?
4. Do you keep records showing stock on hand and available?

Maximum rating 16
Your rating .....

Often material must be handled between each operation in the plant. This is a source of waste. Mechanical means are available for almost every material-handling problem in the non-metallic industries.

Questions:

1. Is more than 90 per cent of the material produced mechanically transported?
2. Has your plant layout been scientifically studied to avoid back-travel and needless transporting?

Maximum rating 8
Your rating .....

The financial affairs of a company are dependent upon many factors. Scientific planning is replacing the old methods of meeting emergencies by the best available method.

Questions:

Have you a budget of expenses separated by departments?

2. Are your seasonal requirements understood and provided for by adequate reserves?
3. Are adequate reserves set up to meet unforeseen contingencies?
4. Have you an organized credit system working with standard credit policies in writing?
5. Have you an organized collection system with standard written policies?
6. Are cash discounts taken?
7. Do you issue periodical financial statements to your banker?
8. Have you an established line of credit at your bank?
9. Do you periodically pay up all outstanding notes?
10. Are your financial books audited by a recognized public accountant at least four times a year?

Maximum rating 40
Your rating .....

There is great waste in selling. As great possibilities for elimination of waste exist in selling as in production.

Questions:
1. Have you a sales manager?
2. Have you a standard price list of your product?
3. Have you in writing all of the uses of your product?
4. Have you made a survey of your market possibilities?
5. Have you a standardized plan of remuneration to your salesmen?
6. Have you standardized sales methods?
7. Have you a sales manual?
8. Are salesmen given a period of intensive training?
9. Do you predict sales by establishing quotas for salesmen and districts?
10. Do you have a monthly comparison of sales anticipated and actual sales made?
11. Have you a record of sales lost and the probable reasons therefor?
12. Do you make a systematic record of complaints classified as to causes?

Maximum rating 48
Your rating .....

Every business of any standing keeps books and has some sort of accounting system. Accounting should be more than a mere historical record?

Questions:
1. Do you have a statement of your net worth at least four times a year?
2. Do you have a daily report of cash received from various sources, cash paid out for various purposes and balance on hand?
3. Do you have a daily report of total sales classified and compared with a corresponding period in previous years?
4. Do you have a weekly report of overdue accounts receivable?
5. Do you have a monthly statement of profit and loss?
6. Do you have a monthly statement of quick assets and liabilities?
7. Do you have a monthly statement of expenses divided departmentally or otherwise classified and compared with a corresponding period in previous years?
8. Do you have a weekly forecast of cash that will be required?
9. Do you have a weekly forecast of cash that will be received?

Maximum rating 36
Your rating .....

The office furnishes clerical service to all departments, although it is not a major department in the plant. The clerical function is an important factor in the smooth working of the business.

Questions:
1. Are all clerks under central management?
2. Have you an up-to-date office manual describing routines?
3. Is the work of more than 25 per cent of your clerks measured and individual output recorded?
4. Have you standard practice in writing describing the methods for performing more than 25 per cent of the detailed tasks?
5. Have you an up-to-date layout plan of your office?
6. Are the major routines planned so that work travels from desk to desk, always in a forward direction?
7. Have you a central filing department?
8. Have you a central stenographic department?
9. Are clerks trained to their tasks by an instructor?
10. Are there standardized ranges of salaries for the various clerical positions?
11. Do you have any incentive plan of payment for output other than straight salary?

Maximum rating 44
Your rating .....

To determine the relative efficiency of your organization divide your rating in each section of questions by the maximum rating given. To determine the efficiency of your organization as a whole add all your section ratings and divide this total by the sum of all the maximum sectional ratings. Certain of the above sections are of more importance than others, but, if you handle each section by itself, it matters but little what rating system is used. If there are certain questions that do not apply, they can be eliminated from your particular diagnosis, and those that do apply will serve to indicate your rating.

BARBER-GREENE ADDS

The Barber-Greene Company, manufacturers of standardized material handling machines of Aurora, Illinois, have placed three assistants with their District Managers of Pittsburgh, Cleveland and Detroit. Mr. H. H. Driver will assist Mr. J. A. Gurney of Pittsburgh; Frank S. Howard, Jr., will assist Mr. E. D. Cassel in Cleveland; and Mr. P. S. Frederick will assist Mr. C. B. Gould in Detroit.

Weatherproofing Gypsum Block

GYPSUM, though satisfactory as a plaster and tile for interior work, has not proven satisfactory for exterior construction, the reason being its slight solubility in water. The present use of gypsum block is therefore mainly in the construction of partition in the interior of buildings. If this material could be so improved as to be more resistant to the weather there would immediately be opened a new market for gypsum block which has not as yet been touched. It is probable that if a method is found whereby gypsum block can be weatherproofed, the procedure may easily be modified so as to include such other products of gypsum as stucco, mortar, etc. With this in mind, an investigation of methods of weatherproofing gypsum has been undertaken by the Bureau.

In attacking this problem three general methods presented themselves. First, covering the set material with some waterproof coating in order to keep moisture from the gypsum; second, precipitating on the surface an insoluble compound formed by a reaction of some material with the gypsum; and third, by the addition of an integral waterproofing compound to the gypsum, which when the gypsum has set acts as a water repellent. In the beginning of the investigation many small cylindrical specimens of gypsum were made and treated in one of the ways described above, and then exposed to the weather. At definite intervals of time these were dried, weighed, and tested for absorption. At the end of one year's exposure, panels were made of the same composition as the small cylinders, which upon examination gave promise of satisfactorily withstanding the weather. These panels were exposed to the weather, and are now examined from time to time.

The first method, that of covering the set material with a waterproof coating, has so far given very promising results. Waterproof paints, varnishes, shellacs, whitewashes, paraffins, waxes, stearic acid, etc., have been used. The paints, varnishes, shellacs and whitewashes were not satisfactory, but with paraffin, waxes, and stearic acid very good results were obtained.

However, the second method, that of precipitating on the surface an insoluble compound formed by the reaction of some material with gypsum, has so far proven the most successful. Cylinders of neat gypsum and 1:1 sanded gypsum were made, and when approximately dry were immersed in solution of barium chloride, sodium carbonate, ammonium phosphate, ammonium oxalate, lead acetate, and barium hydroxide. The results obtained with all of the salt solutions did not warrant the recommendation of any of them as weatherproofing materials. However, in the case of hot barium hydroxide, the results were very promising. The success of this material as a means of weatherproofing gypsum is explained by assuming that the barium hydroxide, which penetrates the pores of the gypsum, reacts with the calcium sulphate to form the more or less insoluble compound, barium sulphate. This very slightly soluble barium sulphate coating on the surface of the gypsum cylinder makes it very resistant to the weather. This protection, however, is only temporary, for after a period of approximately two years' exposure the cylinders begin to weather away about as fast as do the cylinders of untreated neat gypsum. After this period, it is probable that another application of the barium hydroxide solution would protect the gypsum for a similar length of time. This is being investigated.

The third method, by the addition of an integral waterproofing compound to the gypsum, which when the gypsum has set acts as a water repellant, has not given promise of good results. Among the integral waterproofing compounds used have been; zinc stearate, glue, gum tragacanth, gum arabic, glycerine, dextrin, and water glass. None of them seems to waterproof the gypsum for any length of time.

Examinations of the panels and cylinders is made from time to time, and as new methods of treatment come to our attention, cylinders are made and exposed for observation.—*Bureau of Standards Technical News Bulletin No. 94.*

American Gypsum Co., Port Clinton, Ohio, at the annual meeting of the meeting of the stockholders elected the following officers: president, J. H. McCrady, Pittsburgh, Penn.; vice-president, F. J. Griswold, Port Clinton; secretary and treasurer, J. B. Davis, Cleveland, Ohio.

A Useful Horizontal Tank Chart

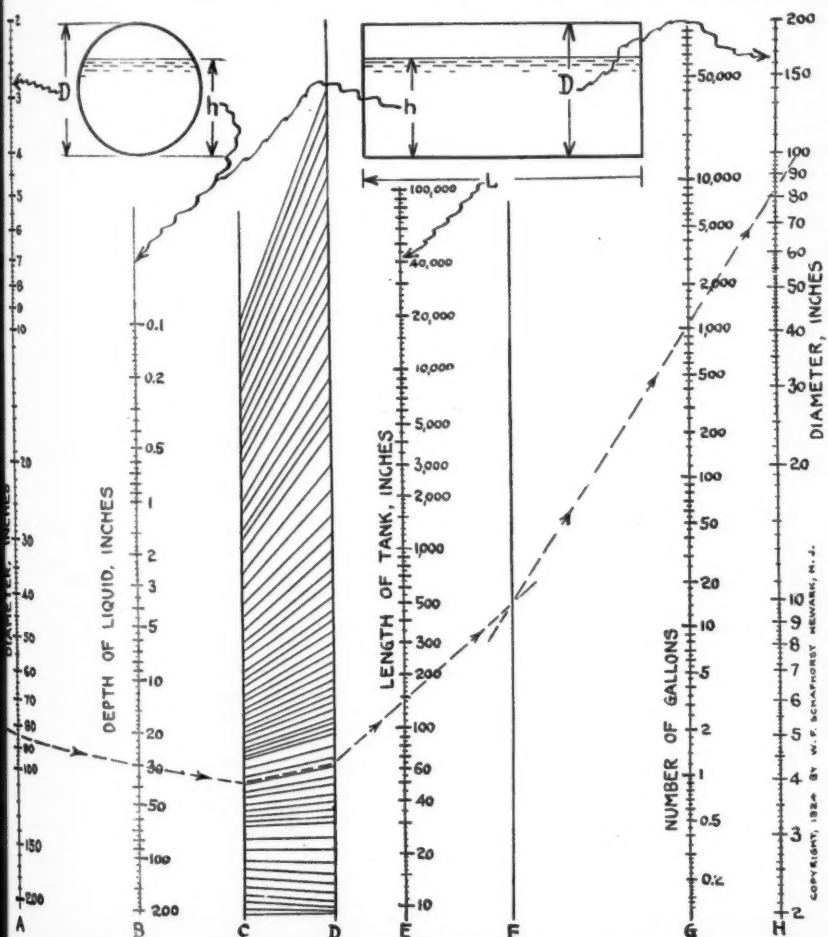
By W. F. Schaphorst

HERE, at last, is a chart that gives the gallons of liquid in any horizontal tank without the use of tables, formulas, figures, or computations of any kind.

Simply start at the left and zigzag a ruler or thread across the chart three times as demonstrated by the dotted line and the number of gallons is immediately found in Column G. For example: How many gallons in a tank 84 inches in diameter, the depth of liquid being 30 inches, and the length of the tank being 142 inches?

Run a straight line through the 84, Column A, and the 30 in Column B and locate the intersection with Column C. By means of the eye follow the radiating "guide lines" to Column D, locating a second point of intersection. From this latter intersection run through the 142, Column E, and locate the point of intersection in Column F. Then from this point run over to the 84, Column H, and the intersection in Column G will be found to be close to 1050 gallons, which is the answer.

One of the great advantages of this chart is that it takes care of any depth of liquid from 1-10 of an inch



to the full capacity of the tank. All guess work is eliminated. To make the chart absolutely clear the writer has included sketches showing the diameter of the tank D, the depth of liquid h, and the length of tank L with wavy arrows leading from them to the proper Columns. By following them no mistake can be made.

The range of the chart is amply wide. It will take care of any diameter from 2 inches to 200 inches and of any length of tank from 10 inches to 100,000 inches. This chart will give an answer much more quickly than tables or formulae. It is surprisingly accurate. It is more complete than tables because it takes care of every dimension between 2 inches to 200 inches whereas tables generally skip many diameters and lengths giving only 24", 28", 32", 34" etc. To avoid confusion all dimensions are given in inches.

Since Column E takes care of lengths or tanks up to 100,000 inches it is plain that not only will this chart compute tanks but it will include long pipes whenever it is desired to compute either the full capacity of such pipes or their partial capacity. 100,000 inches is equal to 8333 1-3 feet.

Inversely the chart may be used very conveniently for determining the length of tank necessary to hold a given number of gallons where the diameter of tank and depth of liquid are known or fixed quantities as is often the case. The method of applying the chart to problems of this character is so obvious that further directions are unnecessary.

McMYLER APPOINTS TEXAS REPRESENTATIVE

The Lewis-Patten Company, San Antonio, Tex., has been appointed as sales representative for the McMyler-Interstate Company. Their territory is the entire state of Texas and they will specialize in the sale of gasoline and steam shovels, clamshell buckets and standard gauge locomotive cranes.

H. V. CROLL TRANSFERRED

Mr. H. V. Croll, who for the past six years was manager of the Southwestern territory for the Traylor Engineering and Manufacturing Company with offices at Los Angeles, has been transferred to the home office of the same company at Allentown, Pa.

Doings at Washington

Public Buildings Bill for $150,000,000 Passed by the House. Pan-American Road Congress at Buenos Aires, S. A.

By Our Washington Correspondent.

THE HOUSE passed the public buildings bill authorizing the expenditure of $150,000,000 over a period of six years. The money may be used for the construction of such public buildings in the District of Columbia and throughout the country as are appproved by the Secretary of the Treasury and the Postmaster General. The administration has approved the bill, which is so framed as to avoid any charge of providing "pork" for members of Congress. The bill now goes to the Senate, where it has a chance of passage before adjournment.

The United States will be well represented, according to plans now being worked out, at the Pan-American Road Congress, which is to meet in Buenos Aires, beginning May 22 next, and which is considered one of the most important gatherings ever held by the American nations. It is understood that five official government delegates will be appointed and that in addition there will be a number from various organizations interested in highway development.

The beginning of a broad program of motor road construction throughout Latin America is looked on as of greatest importance in the commercial and economic progress of those countries and in their trade relations with the United States. It is pointed out that road building in the Latin American countries, few of which at present have any roads to speak of outside of the principal cities, means the opening up of their vast natural resources and the easy transportation of these products to market. It also means the use of a great deal of American road-building machinery.

The coming road congress in Buenos Aires is a sequel to a visit to the United States early last summer by delegates from all the Latin American countries. These road experts made a wide tour of inspection, studying road construction and management methods in this country. Since then national organizations have been formed in a number of their countries to promote the road-building idea. None of the members of the American delegation, which will leave here about the middle of April, have yet been announced.

Pulling Through the Winter

The General Situation Encouraging In Spite of Cold Season That Tied Up Operations; Current Prices

By Our Pittsburgh Correspondent

FOLLOWING several weeks of severe winter weather at New York and vicinity, seriously handicapping and retarding construction operations, there has come about a noticeable resumption in operations and commitments around the middle of February, and the sand, gravel and crushed stone markets bid fair to come into their own at an early date.

Weather conditions, likewise, have gone to minimize pit and quarry operations in this district, as well as in Southern New Jersey and Eastern Pennsylvania. A number of plants were forced to suspend production entirely for this reason and while only for a temporary period, yet working towards a depletion in reserves that cannot well be afforded at this time.

The general situation in the building field is very encouraging at the present time. The month of January produced a volume of contracts totaling close to $111,000,000, in the New York and Northern New Jersey districts; this is an increase of close to 5 per cent over the corresponding month of a year ago, and approximately 10 per cent advance as compared with December, or the month previous. In this same month, proposed work, including that actually on the boards of architects and engineers, aggregated $144,000,000, indicating the forthcoming activity in spring and early summer. February contracts are maintaining well with the January average, and there is an air of optimism among producers and supply dealers.

Minor disturbances have arisen during the past few weeks in the labor branch of the construction industry, rather to be anticipated with the fast approaching spring season. The present trouble is with the structural and ornamental iron workers, as well as the derrickmen; a strike among the last noted will affect seriously the hoisting of stone, as well as other commodities. The men are after a higher wage scale, while there is a complaint. also, against the employment of non-union mechanics.

Market conditions have been more or less uncertain for a fortnight or more, due to a general tendency to push figures to a lower level. This probably has been brought about through the decreased business naturally maturing on account of the recent inclement weather and the ambition of a certain class of dealers to secure orders at any price. In the stone products field, washed gravel is the only commodity which has been affected by a price decline. Other products are holding their own well, rigidly maintaining existing quotations. Both contractors and dealers are now more prominent in the market and a sizable volume of business is being booked for this time of the year. Up to a week or so ago, the supply yards were rather a minor factor in the line of purchases, absorbing reserve stocks rather than placing orders for current account.

Washed gravel at New York has lost its two recent advances, each of 25 cents per cubic yard, and has declined to a level of $1.75 a cubic yard in cargo shipments, alongside dock, wholesale account; the price is the same both for 1½- and ¾-in. sizes, and is now 25 cents below the figure of this same time a year ago. The new level is not as pronounced as it might be, and a rebound to a higher figure before the advent of the spring season would not be surprising. Building supply yards are quoting the material, both sizes, at $2.90, delivered on the job within established zones, and are doing a fair business at this figure.

First grade building sand is maintaining at the level of $1.25 a cubic yard, to which figure it recently advanced, with all immediate indications, pointing to continuance. The call for stocks is fair, and with the breaking of the extreme winter weather, a better supply of material is coming into the market, entirely sufficient for all demands. The retail quotation is $2.00 per cubic yard in Manhattan and Bronx Boroughs, New York. The trend is toward good activity among the producers in the Cow Bay and other Long Island districts with the advent of the spring season.

Crushed stone is selling at $1.75 per cubic yard in wholesale quantities in the New York market, 1½ in. stock, with a 10-cent advance, or $1.85 asked for ¾-in. material. Inquiries are now current for stocks in carload quantities for early spring shipment and sizable business for the producers looms ahead. Local supply yards are quoting the commodity at $3.00 a cubic yard, both sizes, delivered on the job.

The lag in call for Portland cement during January has given way to a more substantial and growing demand for current consumption, while inquiries for future account both with dealers and manufacturers are decidedly encouraging. Established quotations continue in force without change, these being $2.15 a barrel alongside dock, cargo shipments, less bags but subject to cash discount; from $2.55 to $2.60 is asked for material delivered to supply yard or to building site for contractor's account. Retail, the price holds at $3.00 a barrel, with customary bag rebate of 10 cents each. Mill bases in this district are the same as those for several months past, the plants in the Lehigh Valley district of Pennsylvania quoting $1.95, and the Hudson, N. Y., mills, $2.05, without bags.

The New England section, while showing a declining tendency in demand during the past few weeks, is again awakening to more normal conditions, and leading interests in this district report a growing volume of business, expected to advance as the spring season draws near. At Boston, crushed stone is selling at $1.60 a ton, both 1½ and ¾-inch sizes, wholesale, carload lots. Best washed gravel is priced at $1.50 a ton, wholesale, while building sand is being quoted at $1.00 a ton in cargo shipments. Portland cement has declined to $2.60 a barrel, wholesale at Boston, as compared with a previous level of $2.68, while dealers are asking $3.40 a barrel in truckload shipments, delivered, and $3.48 in smaller amounts.

The Bridgeport Sand & Gravel Co., Bridgeport, Conn., has authorized plans for expansion at its sand and gravel properties, to include the installation of a new mechanical washing plant with capacity of about 250 cubic yards of material per day. The company will also make extensions in its crushed stone plant, providing machinery for an output of close to 100 tons per day.

Owing to extremely cold weather, at one time late in January reaching 30 degrees below zero, the granite quarries at Barre, Vt., and vicinity, have been forced to suspend operations, releasing temporarily a large quota of workers. They are expected to resume as soon as climatic conditions are favorable. A number of the quarries have sizable orders on hand, and have been giving employment to full working forces under maximum production.

The De Frain Sand Co., Philadelphia, has purchased a large tract of land adjoining its present sand and gravel properties in Falls Township, near Penns Manor, Pa., and will use in connection with proposed expansion in operations in this district. It is said that development work will be placed under way in the near future.

Cleveland Paving Breakers

Bulletin No. 57, just issued by The Cleveland Rock Drill Company of Cleveland, Ohio, is given over to the Paving Breakers which this company has brought out in recent months. While this is the first bulletin issued on these tools, the Paving Breakers themselves, models C4 and 44 CB have been on the market long enough to be thoroughly standardized. In fact, they are both built of standardized elements, features which have had years of satisfactory service in these rock drills, they say.

Perhaps the outstanding feature of both machines is their ruggedness. Breakage, they say, is seldom encountered on either. Both models are intended to perform satisfactorily all work for which this class of tool is intended, and this is the experience of users. However, it is evident that some operators will prefer a lightweight machine of moderate cutting speed to a heavier, harder-hitting tool. The great saving effected by these machines in removing paving and tearing down concrete and brick structures makes these tools economical and necessary additions to the road builder's and general contractor's equipment.

Generally speaking, the model 44 CB is best suited to such work as trimming down the side walls of tunnels, trenches and similar excavations; work that requires the operator to handle the machine continually over comparatively extensive areas. The C4, on the other hand, finds greatest effectiveness in tearing down old foundations or walls, in loosening frozen or gravelly ground, in breaking up brick, stone, asphalt or any other form of pavement and, in short, in any work requiring a machine of great power and sturdiness.

Because of their rugged construction it is said the expense for repairs is very small, in the case of one owner of four breakers, only 15 cents for one spring, in three months' time.

Expansion in Cement Continues

Steady, Consistent Increase In Plants and Operations. Repair Season Closing, Spring Activity Near.

By Our Special Correspondent.

INCLEMENT weather late in January and early in February has had its effect on the cement mills in the Lehigh Valley district of Pennsylvania, bringing about considerable difficulties and delays in distribution, with retarding of production, causing stock accumulations far beyond normal conditions. The gross distribution for the past month is below that of the same period of a year ago. With a change for the better through moderated weather, there have been heavy shipments during the past week or so; allotments have been moving to dealers and contractors for their early spring operations to insure stocks on the job when needed, and all current requirements are being handled with reasonable dispatch. Incoming business is of encouraging extent, insuring an active season for practically every mill in this district.

Difficulties in operation in recent weeks have lessened the possibility of fully adequate reserves, and a number of plants have been unable to catch up in this direction. Every effort is being turned to this account at the present time, and where possible a certain percentage of daily output is finding its way to the stock house.

Everything points to a large season just ahead. It is currently stated that activities in this district will exceed those of the spring of a year ago, when a record-breaking period was registered. Equipment replacements are being pushed to maximum at the various mills and several plants are now resuming production in full in departments temporarily shut down.

There has been a slight decrease in employment of labor at the Lehigh Valley cement mills in recent weeks, due to enforced curtailment, but the slack is being taken up rapidly and plant quotas will be filled with the advent of the spring production season.

The success attending the development of the manufacture of quick-hardening cement in this district, is encouraging a pronounced trend to large production in this line. Several of the companies in the Northampton section, as well as neighboring territory, are making a country-wide investigation to locate the desired deposits of rock necessary for the manufacture. The product, as previously recorded in PIT AND QUARRY, is now being made at the plant of the Atlas Portland Cement Co., which has received large consignments of rock ore from Europe; the cement, as produced from this base, is capable of hardening within a 48-hour period. It is understood that deposits almost identical to the European variety have been found in New York and Alabama.

The Lawrence Portland Cement Co., Northampton, with mill at Siegfried, is running full with regular working force, and will continue on this basis indefinitely. The year just closed was the greatest in the history of the company. The prospects for the coming year are equally good or better. The twenty-seventh annual banquet of the company, tendered by officers and directors to the department heads, was held on February 6, at the Hotel Allen, Allentown.

The Coplay Cement Mfg. Co., Coplay, is maintaining its usual activity. The company has resumed operations at its Mill B, closed down a number of weeks ago for repairs.

The Alpha Portland Cement Co., Easton, Pa., is continuing close to peak production at its plant at Martin's Creek, Pa., and is said to have booked heavy orders for future deliveries. The plant will hold to the present schedule for an indefinite period.

The Lehigh Portland Cement Co., is on the active list at its mills at Ormrod, West Coplay and Fogelsville, giving employment to a large working force. Heavy bookings are being recorded for the spring period. The company recently held its annual meeting of salesmen, concluding with a dinner, after a two-day business session, at the Hotel Allen, Allentown.

The Atlas Portland Cement Co., is maintaining a good production record at its Northampton mills, while other active companies in this district include the Giant Portland Cement Co., Bath Portland Cement Co., Hercules Cement Corporation, Whitehall Cement Mfg. Co., and the Pennsylvania Cement Co.

The Bessemer Limestone & Cement Co., Bessemer, Pa., is arranging for expansion at its local mills for considerable increase in output. An appropriation of $200,000 has been authorized for the work, to include new

buildings and equipment. The storage capacity at the plant will be enlarged to provide for a total of 250,000 barrels of material at one time. During the past year, an aggregate of 1,250,000 barrels of cement were shipped from the plant, an increase of close to 50,000 barrels as compared with the year previous.

The Signal Mountain Portland Cement Co., Chattanooga, Tenn., is proceeding with its expansion program, to include the installation of a third unit at the plant for considerable increase in output, at an early date. The company is awarding contracts for equipment with the Fuller-Lehigh Co., Fullerton, Pa.; Allis-Chalmers Co., Milwaukee, Wis.; the Chattanooga Boiler & Tank Co., Chattanooga; and the Walsh & Weidner Boiler Co., Chattanooga.

The Wabash Portland Cement Co., Detroit, Mich., with plant at Stroh, Ind., has arranged for the erection of initial buildings for its proposed new plant at Osborn, Ohio, and has given an award to the Indiana Bridge Co., Muncie, Ind., for the structural steel framework. The works are reported to cost in excess of $500,000, with equipment.

Bonnot Unit-Air Ball Mill

Bulletin No. 64, entitled "Bonnot Unit-Air Ball Mill," issued by The Bonnot Company of Canton, Ohio, describes a dependable method of preparing pulverized coal for direct firing of boilers.

More than sixty plants have been designed, manufactured and installed during the past nine years by The Bonnot Company for the central preparation, distribution and burning of pulverized fuel in various types of industrial furnaces. This company, says the bulletin, was a pioneer in the manufacture of grinding equipment for the cement industry, therefore it seemed that the ball mill principle was the logical one for producing a unit pulverizer which would be dependable and economical, for the preparation of fuel for boiler firing.

To remove the finished product as rapidly as it was pulverized the feature of *"Interior Classification"* was evolved, and by the introduction of a central perforated pipe we effect an air-suction practically the entire length of the grinding chamber. Thus the finished product is instantly removed from the mill, regardless of its location in the chamber.

New Osgood Bulletins

Three new bulletins recently issued by The Osgood Company of Marion, Ohio, tell pictorially and otherwise the varied story of Osgood operations in several fields.

Circular No. 251 describes, with many illustrations, how the Osgood works in road and street work, featuring the following: ¾ yard, 1 yard and 1¼-yard revolving steam shovels and combinations; ¾ yard heavy duty gas shovels, draglines and clamshells; 1½ to 6-yard railroad steam shovels; continuous tread, traction wheel and railroad truck mountings, locomotive cranes and dipper dredges.

Circular No. 253 describes the Osgood Power Shovel, Dragline, Clamshell, Crane in gasoline, diesel and electric power. This machine has electric starting, large storage battery; carburetor air cleaner; power boom hoist; enclosed steel cab; wire rope thrust; minimum of gears and clutches; power steering. This shovel is described as having a simple and powerful wire-rope thrust, self-adjusting to any boom angle. This is equipped with a gasoline engine, four-cylinder or six; and a manganese or plate front dipper.

Bulletin No. 250, Osgood Facts and Pictures, tells about the construction of Osgood revolving and railroad shovels. This illustrates the ¾-yard, 1-yard and 1¼-yard revolving steam shovels and combinations; ¾-yard heavy duty gas shovels, draglines and clamshells; and 1½ to 6-yard railroad steam shovels; continuous tread, traction wheel and railroad truck mountings; locomotive cranes and dipper dredges.

In the design of Osgood revolving shovels special attention is paid to making them easily convertible to crane, clamshell and dragline services, equally efficient in each class of work. The machine is of heavy, solid construction, the engines powerful and responsive. The continuous tread truck is rugged and simple in construction.

Copies of these bulletins will be mailed on request.

MEXICAN BRANCH OFFICE

The Chicago Pneumatic Tool Company announces the opening of a branch office in Mexico at San Juan De Letran, 15 Mexico, D. F.

Coarse Aggregate, Concrete Mixtures

Various Tests as to Coarse Aggregates in Concrete Mixtures on Roads and Other Jobs Are Being Followed Up. Recent Events.

By Our Indianapolis Correspondent

JUDGING FROM all indications the sand and gravel and the crushed limestone interests of Indiana are just laying the groundwork for a finish fight, the principal question being, which is the more desirable for coarse aggregate in concrete mixtures on improved roads and other concrete work? The final outcome is being watched with more than usual interest by highway officials, both state and county, most all of whom are doing their utmost to maintain their balance "on the fence."

The last sally has come from the sand and gravel industry, which recently had an all-day series of tests and meetings, proving conclusively—to them—that sand and gravel is more desirable. Back around the first of the year a group of members of the Marion County Gravel Association and a few contractors and engineers conducted some tests of concrete mixes relating to the ratio of the aggregate to the finished concrete. The results of the tests were of such a nature that it was deemed necessary to pursue them further and for that purpose the Indiana Sand and Gravel Producers' Association was asked to participate.

More than 150 persons, consisting of members of the association, county and state highway officials, contractors and engineers saw the last tests of the association held at the plant of the Granite Sand and Gravel Company in Indianapolis. Members of the gravel association declare the results obtained will mark a revolution in the methods of batch mixes in concrete construction. The tests were conducted with crushed limestone and washed screened gravel, both of county specifications and each mixed with the same kind of mortar of sand and cement.

Test number one consisted of making two slabs of concrete, one with a stone aggregate and the other gravel. A one-two-three-mix was used, seven sacks of cement, fourteen cubic feet of sand and twenty-one cubic feet of coarse aggregate. The resultant concrete showed 26 cubic feet of crushed stone concrete and 29½ cubic feet of gravel concrete. Gravel men say this test proved to them that the increased weight of gravel per cubic foot over stone caused a greater increase of weight in the finished concrete.

Another test was conducted, using the same weight of each kind of material. Two slabs were made, each one cubic yard, using a certain given equal amount of both materials. A slight overrun was obtained in the gravel mix, which when weighed showed a 68 pound increase in weight in the gravel concrete. A further test was made using a one-two-four mix, such as is used in reinforced concrete and the results were practically the same except that the stone had an increase of 62½ pounds on the gravel. The finished slabs will be weighed at the end of the seasoning period to get complete weight data.

Officers say the conclusions arrived at by the association are that a concrete mixture can not be determined before mixture by the bulk measure of the aggregates if a proper resulting concrete is to be obtained. That in order to obtain a proper mixture or the proportions thereof, the aggregate must be proportioned by weight and not by cubic measure; that corresponding values of finished concrete can not be obtained by cubic measure of the batch lots on different aggregates unless the weight per cubic unit is the same; nor can the resulting concretes be impartially judged if the same quantity of cement is used with the resulting concrete of each aggregate varying in cubic measure.

The recommendation of the association is that the proper mixture proportions must be based on the weight of the concrete desired. If a one-two-three mix is desired, the cement will be one-sixth of the total, the sand one-third and the aggregate one-half. By dividing the weight of the finished concrete desired by "six," the amount of cement is obtained. On large construction this can be determined from small batches that will hold good for the larger quantities. The weight method, gravel men say, does away with all uncertainty as to the proper proportions. Heretofore in Indiana, the contractors and inspectors have been figuring their cement content, not with regard to the unmixed aggregate, but with the finished yardage of the poured concrete. Officials of the association say

that the question of batch mixes and proper proportion of aggregates can be handled easily and successfully by the weight method.

Much credit is due George V. Miller of the Granite Sand and Gravel Company for the work he has done in making possible these tests.

George G. Schmidt, the new county surveyor of Marion County, Ind., the most populous county in the state, will not take any definite stand in the controversy over the use of stone or gravel as a coarse aggregate in the building of concrete roads. For some weeks there has been a controversy in the board of county commissioners as to the relative merits of gravel and stone for this purpose and a majority of the board was favorable to the use of stone. Charles O. Sutton has replaced Albert Hoffman, who favored stone on the board, and stated that he was not taking any arbitrary stand. He said he would be guided largely by the wishes of the taxpayers who petitioned for the road. The petition generally specifies whether it is desired that gravel or stone be used.

In prepartion for a heavy demand for sand and gravel for building purposes and street and road construction during the spring and summer months, the Indiana Gravel Company, Indianapolis, has completed improvements to its plant in Indianapolis, increasing the production capacity and enlarging storage facilities. Jesse A. Shearer, president of the company, is also secretary-treasurer of the Indiana Sand and Gravel Producers' Association.

"Additions to our two plants will increase the capacity for producing sand and gravel by about 200 cubic yards a day," Mr. Shearer said. "This will make a total daily output of nearly 1,000 of four grades of gravel and sand. In erecting a large steel bin with a capacity of 125 tons of fine sand, the storage facilities of the plants will be increased to 1,400 tons. Other improvements made include the new sand separating tank, with a capacity of 500 tons a day, and a new water pump capable of pumping 750 gallons of water a minute on an eighty-five foot head.

Appleton Sand and Gravel Co., Appleton, Wis., at a meeting recently elected Dr. R. T. Jones, president; W. F. Piehl, vice-president; John Balliet, secretary and treasurer; Tony Maukosky, Kaukauna and Charles Simpson, directors.

Safety With Explosives

Safety in the Use of Explosives is a reprint in bulletin form of a paper by N. S. Greensfelder, Editor of The Explosives Engineer, delivered at the Thirteenth Annual Safety Council, Louisville, Kentucky, September 30, 1924. It is published and distributed by The Hercules Powder Co. of Wilmington, Del.

The Inland Collieries Co., Indianola, Pa., has produced, without a single accident from explosives, a million and a quarter tons of coal, which required 215,850 pounds of explosives and 228,000 detonators for blasting it. This record was not made by chance; it is the result of a carefully planned and executed system. The bulletin's description of this system is based on data supplied by safety Inspector James Thirtle. The greater part of the book is given to this story, illustrated with engravings. The latter part of it is given to Rules for Handling, Storing, Delivering and Shipping Explosives, compiled and recommended by Institute of Makers of Explosives; and a description of the Explosives Engineers Trophies, three symbolic panels portraying *Coal Mining*, *Quarrying*, and *Metal Mining*, The names of the mines and quarries winning the right to hold the trophy for a year will be engraved on the front panel.

Island Sells for $39,500

Raccoon Island, at Gallipolis, Ohio, was recently sold to the Union Sand and Gravel Co. of Charleston for $39,500 by Moses Eppling, a prominent sand and gravel man of Point Pleasant.

This island was originally purchased by J. C. Shepherd of Gallipolis for $350. After a few years he sold it to Mr. Eppling for $12,500, at that time considered a very large price. Large deposits of fine sand and gravel are found on the island, and since the digging of these commenced the island has mounted very rapidly in value.

NEW FOOTE DISTRIBUTOR

Foote Brothers Gear and Machine Company has recently completed arrangements with Gibbens & Gordon, 532-534 Canal street, New Orleans, La., for the distribution of Foote IXL speed reducers and gear products for the territory surrounding New Orleans.

Ours Is a Hardy Industry

Producers Keep Busy All Winter—Or Keep Busy Mending Their Boats. Busy River Season Expected

By Our Eastern Correspondent

OPERATIONS in the sand and gravel markets at Pittsburgh are striking a fair average for this time of year, particularly when the weather conditions have been so unfavorable to any pronounced progress in the local industry. Freezing temperature has necessarily curtailed production and heavy ice in the rivers has gone to retard the plying steamers. Authentic reports from Franklin, Pa., show that the Allegheny River is frozen for a total distance of 125 miles, to a depth of 8 to 12 in. in different localities. The Monongahela River, likewise, is frozen in various sections, making river traffic hazardous.

With production at a lower ebb, more attention has been directed to vessel repairs and the construction of new barges and steamers. The Dravo Contracting Company is particularly active in this line for the sand and gravel trade, and the Neville Island yards of this company are running on a capacity basis. Equipment interests, also, are turning a sizable business, for the industry is showing no hesitancy in making investments for future operations.

Reserves of sand and gravel have been called into utility in recent weeks on account of closed production conditions, and there has been a fair general trade to absorb hundreds of tons of material for current account. Future business, as well, is a factor of particular prominence at the present time, and sizable orders have been booked by some of the leading interests for early handling.

Prices maintain quite uniform, with strong tendency to hold at existing levels whether or not a normal demand ensues. Best river sand is being quoted at $1.50 to $1.55 a ton at yard hoists to contracting companies, with dealers securing the usual 10 per cent discount from these figures. Material loaded at the yard hoists runs from $1.85 to $1.90 a ton. Washed gravel is being sold around $1.15 to $1.20 a ton at producers' hoists, both 1½ and ¾-in. sizes, wholesale account, with 10 per cent less to dealers. Loaded stocks are at $1.50 and $1.55, while for retail account, the supply dealers are asking about $2.50 to $2.60, delivered on the job.

Crushed stone continues in the wholesale markets at $2.85 a cubic yard, carload shipments, with dealers asking close to $4.00 for stocks delivered, both 1½ and ¾-in. grades. The call for Portland cement continues good and a fair quantity of material is being turned for immediate disposition. There has been no marked fluctuation in quotations during the past month, the price wholesale standing at $2.19 a barrel, less bags, subject to cash discount. Supply yards hold to a level of $3.00 for cement, delivered on the job, with regular bag rebate.

J. K. Davison & Brothers, Pittsburgh, have closed a contract with the Dravo Contracting Company for the construction of six all-steel barges of hopper type, to be 26 ft. wide and 135 ft. long, 10 ft. deep. The Davison company expects to use the floats for river service in the spring. A marine concrete mixer is also being added to the fleet of this organization, to be used for river improvement work. The vessel will be 40 ft. wide, 91 ft. long and 6 ft. deep, the largest boat of its type on the rivers in this district. It will be provided with a 2-yd. capacity mixer and a 15-ton derrick. The company has completed repairs on the steamer, "National," and the vessel will be placed in service immediately; the reconditioning was handled at the Elizabeth marine ways. The company plans to develop peak capacity on the Allegheny River during the coming season, using its electric-operated digger, so prominent in production during the past year. George McC. Davison is president of the company.

The Rodgers Sand Company is maintaining its usual activity and is looking forward to an active season. J. Herman Rodgers of this company died recently and the funeral services were attended by a large group of Pittsburgh rivermen.

NEW JONES GENERAL CATALOG

The new General Catalog No. 30 of the W. A. Jones Foundry and Machine Company is just off the press and it contains 448 pages of Power Tranmission Machinery data, including cut gears, cast gears, spur gear speed reducers, enclosed worm gear drives, cast iron pulleys, friction clutches, sprocket wheels, hangers, pillow blocks, couplings, rope sheaves, etc.

Clutches for Industrial Machinery

THE rapid development of all kinds of industrial and material handling machinery during the past decade has presented many specific problems to be solved. Manufacturers of internal combustion motors have done their part in developing sturdy, reliable and efficient power units which are now accepted as standard in many fields. These developments required something new in clutches, built along somewhat different lines than those used in the automotive industry. It was necessary to have a clutch which would handle the full power of the motor at all times without distress and have the ability to start and stop frequently without over-heating.

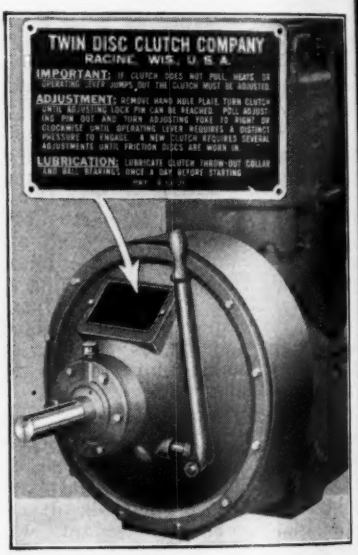
The first market for this class of clutch was in the farm tractor, from which it rapidly extended into road and material handling machinery, contractors' and oil well machinery and many other fields.

A logical development was the standardized power take-off unit as shown in cut. These units attached to internal combustion motors are now commonly used in all classes of equipment. A still further development embodied the attachment of an enclosed reduction gear, permitting the use of a high speed engine and power take-off unit which delivers its power at a materially reduced speed. These units are now generally used in paving machines and similar equipment.

The success of the disc type clutch in industrial machinery has led to their rapid adoption by machine tool manufacturers as installations requiring the use of anti-friction bearings in pulleys and for other purposes.

Many other applications of machinery have been made with uniform satisfaction and the mass of experience in various fields has made it possible for manufacturers to select a suitable size clutch for any application with the same positive assurance that an engineer would have in designing a part in which he used a standard formula.

In selecting a clutch, however, it is very essential that it should be well adapted for the work it has to perform. Consideration should be given to simplicity of parts, ease of replacement of wearing faces, simultaneous adjustment of all pressure members when necessary, ample areas, good workmanship and advanced design. All these features are incorporated in the power take-off unit shown in cut. The friction members are of the flat type, allowing considerable elasticity in designing for various powers, and also permitting an easy replacement when necessary. Adjustment is performed by a yolk screwed on the hub, and carrying the pressure fingers. As these latter are ground in position when assembled, it follows that screwing or unscrewing the yolk carries



The Twin Disc Clutch.

the pressure fingers backward or forward together, so that pressure on the clamping member is equalized over the entire surface. The yolk is secured by a simple finger lock which does not necessitate the use of tools in adjusting. With a power take-off unit attached to the gasoline motor, we have a power transmitting element entirely enclosed and, due to its construction, a rigid alignment with the crank shaft, which will always be maintained. Lubrication is simple and positive, and the operation of the clutch entails very little effort on the part of the operator.

Clam Shell Bucket Requirements in Modern Cement Plants

By E. L. HARRINGTON

IT IS of particular interest to analyze the requirements governing the use of clam shell buckets for handling the various materials commonly used in the manufacture of portland cement, inasmuch as the various processes of manufacture require so great an amount of material handling.

In considering suitable clam shell buckets for this work it must, therefore, be borne in mind that such materials as clinker, limestone, clay and gypsum are comparatively heavy, weighing from 90 to 100 lbs. per cu. ft. In view of this fact, a clam shell bucket might be entirely suitable for handling coal and prove to be quite inefficient for work of this nature.

Another phase of bucket requirements which has to do specifically with the handling of hot clinker, is the importance of having the closing line always protected from the heat. It has been found on some types of buckets, where the cable is directly exposed to the hot clinker that there is a tendency for the cable to become annealed. This not only causes the cable to deteriorate rapidly, but it results in quite a loss of elasticity.

This leads logically to the desirability of using a type of clam shell bucket having a closing device which offers no obstruction whatever to the material passing into the scoops. The freedom from clogged sheaves and excessive cable maintenance cost, is therefore, best accomplished by the type of bucket operated by a closing device which rises free from the material as the bucket closes. This principle is best illustrated in what is commonly termed the Power Arm Type Bucket.

With further regard to excessive cable wear, it will be well to mention the fact that regardless of the type of bucket used, it is imperative that the sheaves be arranged in such a manner that a perfectly straight cable lead will be maintained whether the bucket is in an open or closed position. It is a matter of common experience that a side lead or chafing of the cable, especially with sheaves at very close center distances, proves highly disastrous to both the cable and sheaves.

It is highly important, particularly in handling such materials as mentioned above, that a clam shell bucket be built with scoops which are sufficiently rugged and durable to withstand the abuse of severe service. In other words, the scoops are the business end of a clam shell bucket and consequently a great deal depends upon their construction.

The Williams Power Arm Type Bucket.

A source of great annoyance in many buckets is the tendency after several years wear for the scoops to become out of alignment. This is a point to which careful consideration can well be given. In fact, the best assurance of scoop alignment even after many years wear is the type of main hinge construction which provides for a rigid single-piece hinge casting which serves as a bridge between the two scoop side plates. This construction will permit of bracing the side plates of the opposite scoop in much the same manner by securing the two outer hinges fast to the main hinge shaft. Our investigation shows that there are but few high grade clam shell buckets on the market employing this desirable feature.

It is interesting to note that these essential phases of clam shell bucket performance as apply to the cement plant industries are being considered in the light of their true importance. In this connection, the Peerless Portland Cement Company, who are building a new cement plant at Detroit,

Michigan, are installing four 3 cu. yd. Power Arm Type Clam Shell Buckets and one 1 cu. yd. Power Arm Type Clam Shell Bucket furnished them by the G. H. Williams Company, Erie, Pennsylvania. We are advised that these buckets measure up in every respect to the essential requirements outlined above. In fact, we find that Williams Buckets are being used quite extensively by various cement plants throughout the country because of their particular adaptability to that class of work.

White Performance

According to records compiled by The White Co., 100,000 miles has become common performance for a White truck. In fact in the light of abundant evidence it may be said to have become standard performance. Today the owners of 4195 Whites report their trucks have each run 100,000 miles or more. Hundreds of others, of which the company has no accurate records, have exceeded that mileage. Scores have passed the 300,-mile mark and are still giving dependable service while some have gone so far as to exceed 500,000 miles in the routine of their daily work.

Building Permits in 1924

The following lists of building permits issued in 1924, as compared with 1923 have been issued by the Straus service. It will be noted that while 1924 shows an increase over 1923, the increase came almost wholly from three large cities on the Atlantic coast:

	Year, 1924	Year, 1923
1. New York, P.F.	$843,270,328	$ 791,067,966
2. Chicago	296,893,985	329,604,317
3. Detroit	160,064,825	129,662,711
4. Los Angeles	150,147,516	200,133,181
5. Philadelphia	141,737,460	122,650,935
6. Cleveland	63,014,900	69,390,540
7. San Francisco	57,852,972	46,686,622
8. Boston P.F.	53,031,931	40,626,352
9. Baltimore	45,771,050	37,590,491
10. Washington	45,525,128	49,623,606
11. Milwaukee	45,375,542	39,007,845
12. Newark, N. J.	42,483,876	35,507,219
13. St. Louis	39,831,639	41,443,755
14. Pittsburgh	34,156,550	32,915,312
15. Oakland, Cal.	31,223,485	27,628,897
16. Rochester	29,588,762	21,938,764
17. Portland, Ore.	29,219,425	25,247,135
18. Buffalo	28,582,345	27,907,000
19. Seattle	27,279,500	22,482,678
20. Indianapolis	26,524,575	27,307,279
21. Dallas	26,402,814	20,988,319
22. Denver	26,310,250	20,641,750
23. Providence	25,381,700	21,622,900
24. Cincinnati	24,423,470	27,150,520
25. Memphis	23,757,040	19,545,980
Total	$2,317,851,568	$2,228,371,922

P.F. indicates figures are for plans filed instead of premits issued.

One of the Interesting Exhibits at National Crushed Stone Convention.

The Miami Fordson One-Man Power Scraper

THE Miami Fordson One-Man Power Scraper is a revelation for contractors having large amounts of dirt or sand to move. This ingenious machine has been manufactured by The Miami Trailer-Scraper Company of Troy, Ohio for the past year and at the present time they are increasing their production to handle the growing volume of business.

The scraper is designed exclusively for the Fordson Tractor. The power winch is constructed so that it bolts onto the rear axle housing with four (4) stud bolts and clamps onto the rear axle of the tractor by means of a U-bout. This winch is made of a heavy casting with a worm and gear to operate the revolving drum. The gearing is driven by a friction clutch which power is taken from the belt pulley arm on the tractor to the revolving drum on the winch. To the drum is attached the ⅜-inch cable which elevates the scoop to any desired position.

When loading the bottom of the pan is almost parallel with the ground and remains in the same relative position until fully loaded. This reduces the drawbar pull of the scraper about 50 per cent over any other machine. It also permits the scoop to fill to capacity every trip. The operator drives forward at the same time holding the control lever at his right. The pan is instantly lowered to the desired depth. As soon as the pan is completely filled, the operator pushes forward on the control lever thereby engaging the friction clutch. This causes the winch to operate and by means of the cable, elevates the front of the pan to about a 15 degree angle. The bottom of the pan at the rear is then about 9 inches from the ground.

In this position the driver runs to the dumping point in either second or high speed at a rate of from two to six miles per hour. The pan is so designed that the dirt cannot roll off either at the front or rear.

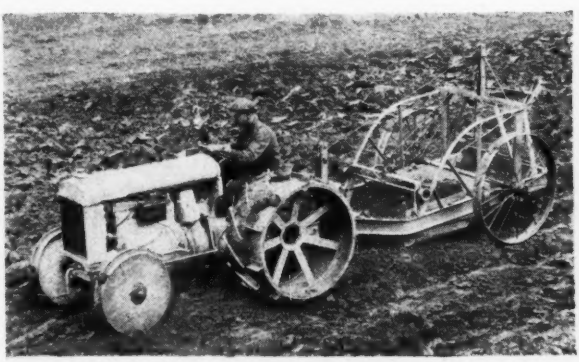
The Miami Fordson One-Man Power Scraper is exactly what the name indicates. A power scraper operated by one man, loading, transporting and dumping by the tractor driver from the tractor driver's seat without stopping—a long continuous day by day operation delivering every trip between 18 and 21 cubic feet rounded load of dirt.

For moving dirt or sand in road construction; for city subdivision work; for stripping coal veins or gravel pits; for excavation; or for building embankments—this machine cannot be excelled. The low initial cost, low depreciation and low operating costs—makes it one of the most popular machines on the market today.

The tractor operates three times as fast as horses in this class of work. One man loads, drives to the dump, unloads and spreads material and returns to the loading point without leaving the tractor seat. It all is accomplished with the one lever which operates the winch. The tractor power does all the work.

As soon as the unit reaches the dump, the operator again pushes forward on the control lever and again winds the pan up to a perpendicular position. This allows all of the dirt to roll out at the rear. The material will dump all in one spot if the tractor is stopped for an instant, but will distribute it over the ground if kept in motion.

The operator then returns to the loading point ready for another load. If sharp curves are encountered, the scoop can be turned in a very small radius. It can also be easily backed up to any given position.



The One Man Power Scraper in Loading Position.

General Detail

When the operator of The Miami Fordson One-Man Power Scraper returns to the loading point, he pulls backward on the control lever at his right side. This lowers the pan ready for another load.

If a stone or root is struck while loading, the wheels of the tractor will spin around. The operator then raises the pan slightly, goes over the obstruction and immediately lowers it again on the other side to get a full load. In this manner the unit cannot become stalled for any reason. If the pan should get under a stone so large it cannot be raised, the entire unit can be backed to release it and then proceed as above outlined.

The scraper is built entirely of steel—well reinforced at every vital point. It is so constructed that it can be disconnected from the tractor in about thirty seconds. This leaves the tractor free to use for plowing, grading or trailer hauling. The power winch does not interfere with the regular hitch and may be left on the tractor permanently, as it does not operate except when the friction clutch is engaged by the control lever.

It has been proved many times by actual performance that a Miami Fordson One-Man Power Scraper Unit will replace four teams and six men. This saving is enormous even over a short period of thirty days.

Asphalt Production Gains

The imports of ozokerite and other mineral waxes were 4,856,357 pounds, valued at $213,407, a decrease of more than 40 per cent in both quantity and value from the imports in 1922. The exports of unmanufactured asphalt were 72,628 short tons, valued at $1,500,869, an increase in both quantity and value. The exports of manufactured products were valued at $1,154,976.

Sauerman Bros. Incorporate

THE January issue of *Sauerman News*, issued by Sauerman Brothers, Chicago, contains announcement of the incorporation of this company under the Illinois state laws.

The Sauerman Bros. company was first established by John A. Sauerman in 1909 and conducted by him individually until 1911. His brother, Henry B. Sauerman, then joined him in a co-partnership, taking charge of the engineering end of the business. This co-partnership continued until the death of Henry B. Sauerman in 1919. The business was then taken over again by the surviving partner, and conducted as an individual under the firm name of Sauerman Bros.

This business was founded upon the idea of designing and developing machinery which employed the use of wire rope for the transmission of power from the power unit to a distant excavator. Up to the present time all efforts and energies of the business have been expended upon the development of slackline cableline excavators and power drag scrapers and accessories pertaining to this type of excavating machinery. Rapid strides have been made in wire rope engineering field has become better educated to the use of wire rope in connection with excavating and material moving machinery. Greater efficiency and economy will result from more general application and use of wire rope in this field.

The company is organized as a close corporation, all stock being held by the employees. There is no change in the policies or general management of the business. Relations with customers will not be affected in any way whatsoever.

The officers of the new corporation are: John A. Sauerman, President and Treasurer; D. D. Guilfoil, Vice-President; G. H. Tompkins, Secretary. These officers, together with the following, are the directors: L. E. Dierks, W. R. Elden, H. A. Roe, B. T. Macy, Louis McLouth and Edw. T. Pares. Mr. Pares has been the firm's attorney for a number of years. The other directors and officers are all old employees of the business and hold managerial positions.

The Armorframe Coal Crushers

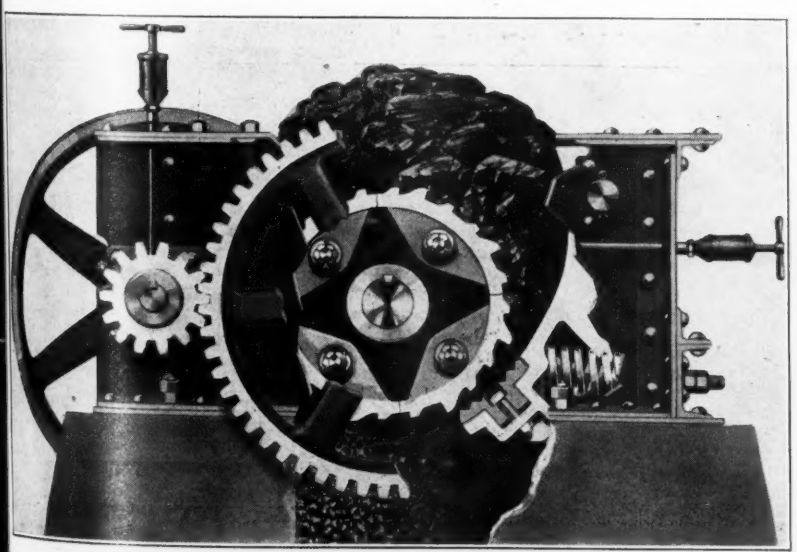
THE increasing efficiency of other units of the modern power plant, both large central stations and smaller industrial plants, has thrown an increasing burden upon the coal preparation equipment to furnish finer and more uniform sizing of coal with unfailing reliability.

With the constantly increasing popularity of the single roll type of crusher for stoker coal preparation, crushing coal for pulverizers, gas plant use, and other purposes, has come a corresponding demand for utmost dependability of the crusher unit. This type of crusher has been generally accepted as standard, because of its finer and more uniform product, simplicity of construction, low upkeep cost, and greater dependability.

In operation coal is fed to the crusher in any quantity desired. The rotating toothed roll draws the coal into the tapered opening between the roll and breaker plate, quickly reducing it to the desired size and discharging it below to the belt, elevator, or direct to the bunkers. The cross section illustration indicates clearly the operation of the crusher, as well as the spring relief in case of iron in the feed. The natural agitating action of the teeth passing through the coal on top of the roll produces a shaking action which carries the finer pieces of coal in the feed rapidly through the crushing zone with a minimum of crushing, which partly accounts for the low percentage of fines produced in this type of crusher. The size and adjustment of the spring suspension to prevent the yielding of the springs for any except uncrushable materials, accounts for the minimum of oversize.

With the background of more than thirty years of evolution and development, "Pennsylvania" Single Rolls have passed through the cast iron stage into steel frame construction. These crushers have now been perfected in the "Pennsylvania" ARMOR-FRAME Series of single roll coal crushers.

For average conditions and capacities in power plant work the nearest approach to the ideal coal preparation service rendered by the Brandford Breaker on large tonnages, is obtained from the Single Roll Crusher. Minimum oversize and minimum fines have always been characteristic of this type, and with unbreakable fabricated steel frame construction, in addition to two other safety devices, the danger of breakdown from tramp iron in the feed is definitely eliminated.



Section Showing In Detail Crusher.

Bethlehem Section 30 inch I-beam girders form the side frame construction of these crushers as shown in the accompanying illustration. Cross members of heavy channel and angle plate are hot riveted to the girder beam side frames to form the rigid unbreakable unit construction. Electric steel bearing housings, accurately shouldered into the side frames to take the shear, and hot riveted in position, are fitted with interchangeable die cast bearing bushings, and thorough lubrication is provided by steamboat type grease cups piped to "Safety First" locations.

A segmental roll of special patented construction with no bolts through the crushing surface to weaken the segments, affords greatest strength and provides ready accessibility for changing when rarely necessary.

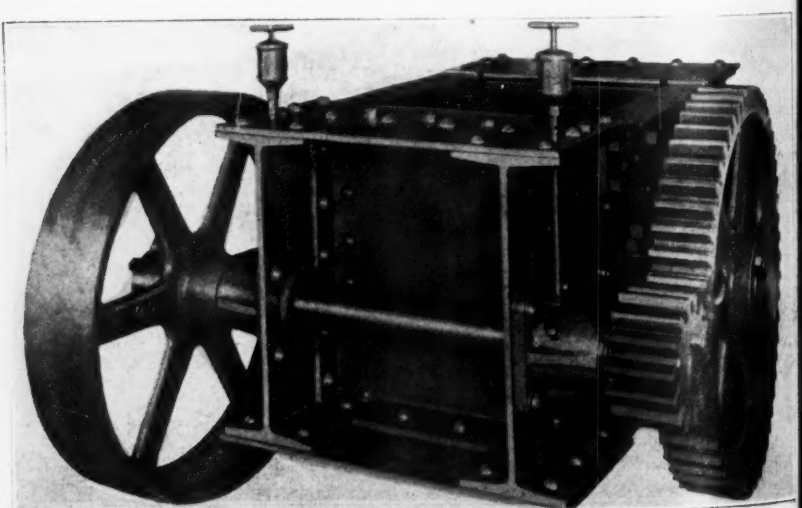
The frame carries, in addition to the main roll shaft and the countershaft, a pivoted breaker plate which is readily adjustable to and from the crushing roll to vary the size of product as needed. A 1-inch product with little oversize can be supplied for stoker feed or for pulverizers; 6-inch crushing for preparation of coal for hand fired locomotives is equally possible. Any size between these two limits is easily obtained by means of the breaker plate adjustment.

Supporting the breaker plate are heavy compression springs, designed to yield for the passage of tramp iron or other uncrushable materials, but which will not permit the passing of oversize coal through the choke feeding of the crusher. The ARMORFRAME operates equally well without feeder and regardless of the amount of coal in hopper or bin over the roll.

Besides the spring suspension of the breaker plate, a special safety device employing an ordinary steel bolt in hardened steel bushings prevents breakdowns in case of large iron in the feed. In normal operation this bolt transmits power from the flywheel, to the yoke which is keyed to the shaft. This safety device is positive in operation. Both the pinion on the countershaft and the heavy main gear on the crushing roll shaft have cut teeth to insure smooth operation.

Triple protection against tramp iron is thus afforded in this crusher, first with the unbreakable steel frame, second with the relief springs, and third with the positive shear pin safety device. In this design the wearing parts are all in plain sight and can be readily inspected. This accessibility helps to avoid accidents and shutdowns which may result from concealed or inaccessible wearing parts.

Coal crushers are naturally subject to neglect and abuse, and rarely get any attention except for occasional lubrication. It is imperative, there-



The Armorframe Coal Crusher.

fore that they be of powerful construction to successfully withstand this kind of usage. The "Pennsylvania" ARMORFRAME, in spite of abuse and neglect, can be depended upon for unfailing coal preparation, free from tramp iron troubles. This ARMORFRAME Series opens a new chapter in modern coal preparation, affording dependability, product of required size, and minimum cost of preparation per ton, indefinitely.

Hobbs Chains and Hoists

CONFIDENCE in one's products is an excellent thing, and if the statements made by the Clinton E. Hobbs Company of Boston, Mass., are any indication, the chains made by this company warrant much confidence.

"We know beyond the possibility of doubt," says the Hobbs catalog, that our chains are the very best made in America. It isn't possible to make better. We've never had anybody tell us other goods were superior; we've had scores tell us ours were."

Iron is chosen according to the work the chain will be required to do. In each grade and kind of chain, the best iron made for each particular purpose is used.

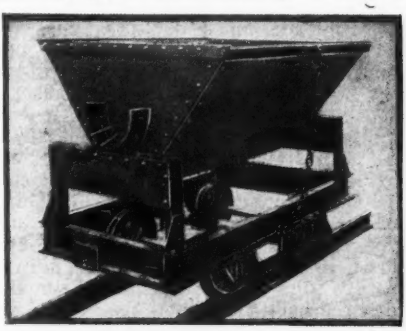
Catalogue D of Chain, Chain Fittings and Chain Hoists, is a book of 142 pages, illustrated with hundreds of engravings showing the wide line of Hobb chains which are of every variety and purpose. Sixty-five pages are given to these. Following these are Grab Hooks, Sling Chains, Boom or Rafting Chains, Half Traces, Kentel Chains, Detachable Link Belting Chains, Sprocket Chain, Attachments, Sprocket Wheels, Anchor Shackles, Eagle Links, Lifting Dogs, Can Hooks, Century Hoists, Screw Hoists, Chain Hoists, and many other miscellaneous products.

The fore part of the book contains Chain Information and Chain Talk, The Care of Chain, Shipping Instructions, and other information. In the rear is a table of Equivalents of English or American Inches in Millimeters, Equivalents of English or American Feet in Meters, Equivalents of American Pounds In Kilograms, and an Index.

E. C. de Villaverde, metallurgist and bearing specialist, is now associated with the United American Metals Corp., Brooklyn, N. Y.

Gehret Brothers Products

Gehret Brothers of Bridgeport, Pennsylvania, are manufacturers of structural steel and ornamental iron work. Among their various products are side dump steel quarry cars which are described by men who have used them as "the cheapest and strongest cars on the market." These cars are 72 inch side dump cars, built for 24 inch standard gauge track with capacity of one cubic yard. These cars are equipped with steel pin rockers



and brass journals that can be replaced instantly.

In addition to quarry cars, Gehret Brothers make a business of ornamental and structural iron work, as well as packing house equipment. They also make a specialty of wire window screens for factories. One of their circulars illustrates certain trusses and girders which were a part of structural steel made for a theatre in Scranton, Pennsylvania.

Worthington Bulletin W-607

Bulletin W-607, issued recently by the Worthington Pump and Machinery Corporation, New York City, deals with Worthington Centrifugal Pumps—A Pump for Every Purpose.

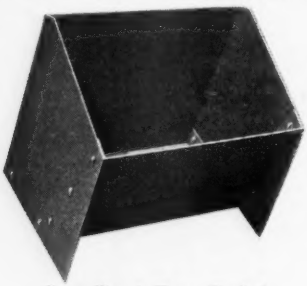
"Worthington and Pumps," says the introduction, "have been for many years synonymous terms, and rightly so; because for 85 years building all kinds of pumps has been our principal business. Worthington's experience has been cumulative and has not been lost through changing personnel." The bulletin describes centrifugal pumps for low and medium heads, high head single stage centrifugal pumps, multi-stage pumps for high heads, double suction balanced turbine pump, special arrangements of pumps and drives, large centrifugal pumps and manufacturing equipment and materials.

The Sykes Company Producing Pit and Quarry Equipment

SINCE 1877 the Sykes Company has been manufacturing fabricated steel products to specification, and their experience in the manufacture of pit and quarry equipment has led them to install special machinery and facilities for manufacturing a complete line of buckets, elevator boots and heads, chutes, etc., for pit and quarry use.

They are now manufacturing and stocking the most popular types of buckets of both rivetted and formed construction. The installation of a new 300,000 pound forming press has made possible the manufacture of pressed steel buckets in large sizes and of heavy material. The buckets carried in stock for prompt shipment include: Continuous Steel Buckets, both overlapping and non-overlapping types; Sykes Super-capacity Buckets for use on elevators to screens or storage bins. These buckets are made with the backs extended over the rear of the pitch line of the chain and have greatly increased capacity.

The Sykes, Style "A," Bucket is built to replace malleable buckets where the service is too severe and too constant for the cast type. They



Low Front Type Bucket

conform closely to standard malleable specifications and may be used with all standard type 'G" chain attachments.

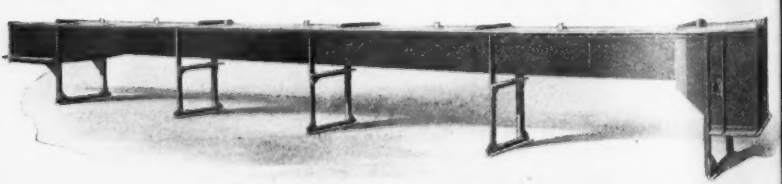
The Sykes Company is continuing to manufacture elevator heads, legs. casings and boots, screw conveyor casings, steel troughs, flights, chutes, hoppers, and bins to the specification of the user, but is establishing its production department for buckets and standard elevator boots and heads to more easily take care of the large demands which are being made upon them.

Lynn B. Easton

It is with deep regret that announcement is made of the death of Lynn B. Easton. Mr. Easton was manager of the Laidlaw Works of the Worthington Pump and Machinery Corporation. His death has taken one whose years with this and predecessor companies have been conspicuous for their variety of service well performed. Mr. Easton died just before his fortieth birthday. In the more than twenty years of work at Laidlaw and in the Sales Department of this Corporation he had held many positions, starting with that of time clerk and ending as manager of the works. His career was a notable illustration of the opportunities open in a technical business to young men with limited technical education, but with intelligence, loyalty and abundant and vital energy. The rare combination of these qualities and genial personality made Mr. Easton an outstanding man, implicitly trusted by those whose responsibilities he shared, and respected by all with whom he came in contact. His loss will be deeply mourned by a large group of loyal friends in the Worthington organization. He passed away at Cincinnati, Ohio, on January 2, 1925.

G. M. C. APPOINTMENT

Otto E. Stoll, general manager of the General Motors Truck Company announces the appointment of A. Banta as assistant to the general manager. Mr. Banta will have complete charge of engineering, manufacturing and purchasing. Mr. Banta has had more than 20 years' experience in the automotive industry both in Detroit and in the East.

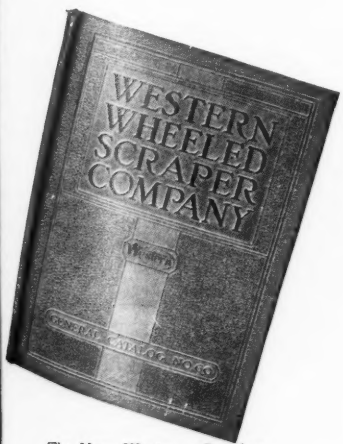


The Sykes Screw and Ribbon Conveyor Casings.

New Western Scraper Catalog

A new book issued by the Western Wheeled Scraper Company of Aurora, Illinois, describes the dump cars and machinery manufactured by this company for handling earth and stone. This book, Catalog No. 60, contains 258 pages, heavily illustrated with new engravings showing the many types made and in use on various operations.

"Western Dump Cars," says the introduction, "have entered into the world's business to an extent not dreamed of when the original designs were placed upon the market. In pits and quarries they are the connecting link between shovel and crusher or grinder. They are indispensable in



The New Western Catalog.

the work of stripping off overburden, also in handling waste material."

Eighty pages are given to Western dump cars; Western road grading machinery occupies many pages also, including such as the Western elevating grader, wagon loader and ditcher, improved model; the Western standard elevating grader with disc plow, improved model; elevated grader for street paving; graders for earth road construction; grader for sub-grading for concrete; grader for ditch excavation; and grader for use in building dams and embarkments. Western contractor's dump wagons and carts are described, also Western drag scrapers, and the Western line of plows; Western-Aurora steel rock crushers and elevators; Western portable gravel screening plant.

"Rollway" W. S. Bearings

Catalog No. 4 entitled "Rollway" Wide Series Bearings, put out by the Rollway Bearing Company, Inc., of Syracuse, N. Y., describes the products of this concern. In their introduction they say:

"The demand created by those already familiar with the load carrying qualities of "*Rolway*" Maximum Type Bearings for a satisfactory roller bearing for use where design features or economic conditions might preclude the Maximum type, and where the extreme precision of the Maximum type might not be required, necessitated the enlargement of our line. In offering this W. S. type or Wide Series "*Rollway*" Bearing we would call the designer's attention to the fact that these bearings are not intended as substitutes for our Maximum or Precision types, but are intended to be complementary to same and have certain fixed speed limitations peculiar to their design."

"*Rollway*" W. S. (Wide Series) Bearings are made in two styles: one having a split planished steel outer race intended for slow speed mechanisms where more costly hardened and ground races are not desirable; the other type uses either or both solid inner, and outer sleeves. Where loads are severe it is said the solid inner and outer sleeve is necessary to secure and maintain the proper contact between roller and race. In common with all "Rollway" Bearings the W. S. rollers are solid and are made from electric furnace alloy steel, whose chemical composition gives the toughness necessary to promote the proper amount of flexibility to prevent fracture from shocks, thus greatly increasing carrying capacity.

The book has specification tables and numerous illustrations. A folder on Rollway Bearings for Crane Hooks is also enclosed with the catalog.

The engineering achievements of the Westinghouse Electric and Manufacturing Co. for the year 1924 are described in a booklet issued by the company under the authorship of H. W. Cope, assistant director of engineering, East Pittsburgh, Pa. This special publication is 8½ in. x 11 in., 52 pages with paper covers. It is profusely illustrated and arranged in an interesting manner and as the title implies is a record of many of the major achievements of the Westinghouse engineers during the year.

Organization Axioms

By W. D. ENNIS.

1. While the form of organization necessarily depends upon the personalities available, it should as far as possible be independent of fluctuations in personality. The loss of one man should not wreck the administrative machinery.

2. The duties prescribed for the elements in an organization should be so automatically inter-related as to make a minimum demand upon the extremely fallible human memory. If A forgets to send C to B, something should necessarily call B's attention to that fact.

3. Authority and responsibility should be clearly defined and coordinated. If A is responsible for the cost of repairs B must not be allowed to order a new roof.

4. Every individual should be able to reach a "Man higher up" without being obliged to travel far.

5. Organizations do not spring fully-armed from the head of the divinity. They must grow and adjust themselves, and should not be expected to grow too fast.

6. Great changes in form of organization should be made with extreme reluctance.

7. Close association and frequent conference between superior and subordinate, and among those of corresponding rank, should be encouraged.

8. An effective organization must stimulate by the force of example. Every man should have specific and ascertainable individual duties which all men can see that he performs efficiently.

9. Each man must be made to feel a sense of personal proprietorship in the work over which he has authority.

10. The atmosphere must be one of mutual considerations and appreciation, Orders are orders; business is not palvering; but it seldom pays to reveal the hand of iron when the glove of silk may cover it.

11. The system of administration must adequately reward the competent; and stimulate, penalize or eliminate the unfit.

12. It should provide a spur and prod for every man; but not one that needlessly irritates him but one that rouses him to do his best. After all, men differ but little in their capacity; where they differ is in the uses they make of their capacity.

Exports and Imports of Hydraulic Cement

The exports of hydraulic cement in December, 1924, were 52,851 barrels, valued at $163,639 of which there was sent to Cuba, 18,089 barrels; to the other West Indies, 2,500 barrels; South America, 15,747 barrels; Mexico, 9,321 barrels; Central America, 3,354 barrels; Canada, 487 barrels; and of other countries, 3,353 barrels. These exports are exclusive of shipments to the following possessions: Porto Rico, 10,633 barrels; Alaska, 3,866 barrels. The total exports in 1924 amounted to 878,543 barrels valued at $2,615,154, which exports are exclusive of shipments to Porto Rico, 98,001 barrels; Hawaii, 53,520 barrels; Alaska, 19,877 barrels.

The statistics of imports and exports of hydraulic cement in January, 1925, are not available.

Imports and Exports of Hydraulic Cement, by Months, in 1923 and 1924, in Barrels.*

	Imports		Exports	
Months	1923	†1924	1923	†1924
January ..	71,686	153,839	74,169	88,596
February .	20,529	162,930	88,531	62,606
March	66,521	160,517	98,861	91,224
April	76,899	148,137	85,662	83,206
May	88,480	161,304	103,634	88,850
June	111,559	196,655	77,203	74,064
July	286,106	108,944	82,774	60,139
August ...	324,008	192,634	73,201	85,883
September	215,785	138,369	77,121	69,470
October ...	172,051	214,987	74,302	79,189
November .	140,590	198,806	85,743	42,490
December .	104,422	173,814	80,487	52,851
	1,678,636	2,010,936	1,001,688	878,543

*Compiled from records of the Bureau of Foreign and Domestic Commerce.
†Subject to revision.

The imports in December were from Belgium, 82,016 barrels; Norway, 43,036 barrels; Esthonia, 33,368 barrels; Denmark, 8,877 barrels; England, 3,991 barrels; Sweden, 1,180 barrels; Netherlands, 500 barrels; Canada, 441 barrels; other countries, 405 barrels.

The imports were received in the following districts: Los Angeles, 56,495 barrels; Hawaii, 33,654 barrels; Florida, 13,422 barrels; San Francisco, 12,504 barrels; South Carolina, 12,123 barrels; New Orleans, 10,711 barrels; Porto Rico, 9,032 barrels; Washington, 8,680 barrels; Massachusetts, 8,382 barrels; Oregon, 7,864 barrels; other districts, 947 barrels.

Sunlight Crushed Stone Co., Madisonville, Ky., is planning improvements to its plant to cost about $25,000. John C. Regan is superintendent.